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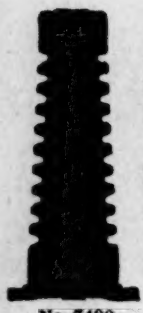

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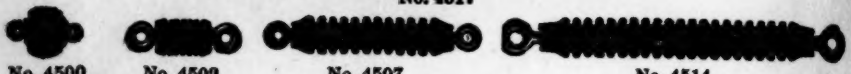

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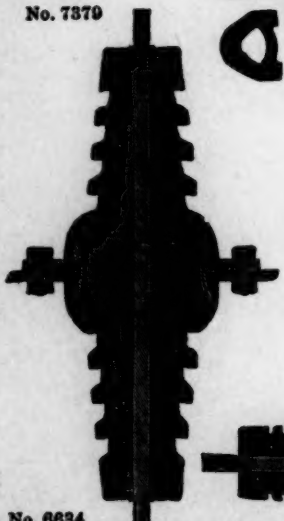

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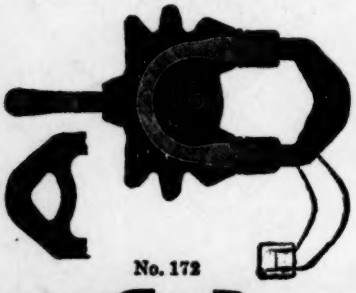

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

CRITICISM IN WARTIME

By Lieutenant H. H. Frost, U. S. Navy

Criticism of those in authority is an important part of the political system of a republic. The threat of public criticism is designed to keep our leaders in the straight path of integrity and efficiency. Errors or dishonesty on their part are given "pitiless publicity," so that the force of public opinion will defeat them at the next election. While this system has its good effects during peace, it has even then its disadvantages. The right of free speech and of the free press is often abused and great men in the public service are violently slandered by political opponents and personal enemies. The charges brought against them may be answered by a counter statement, but there will always be some who will not notice this or will not be convinced by it, and thus the mere fact that a public charge is brought against a man will usually injure his reputation, regardless of the truth of it.

In war we have usually to deal with a different kind of criticism, but one which may bring even more evil results. In a great patriotic country, fighting for a noble cause, we need expect little criticism made for political or personal reasons. There is no excuse whatever for such action in wartime and it should be suppressed by the most extreme measures, as it cannot fail to have the most evil effects. The greater part of criticism in wartime is made with the most pure and patriotic motives. This fact, however, does not prevent it from having numerous disadvantages. Such patriotic criticism is made by important citizens or political

leaders because they believe that inefficient leaders are at the helm or that inefficient methods are being used in the prosecution of the war. They honestly believe that these leaders must be replaced or these methods changed if the country is to win the war.

When is such criticism justified? You may think that this is an easy question to answer. I assure you, however, that it is a most difficult one. It is one, however, of such great importance that the result of the great war might well be conceived to hinge upon it. This is my excuse for presenting some of my ideas on this subject to you.

The sole object of patriotic criticism is to change leaders and methods. Before making such criticism you must weigh carefully the disadvantages which this criticism itself and the changes which you hope to effect by it will cause. Now the first principle I wish to bring to your attention is that there is inherent in every change in a great organization a very considerable disadvantage. Every man who has occupied a position in such an organization well knows what confusion results from changes in leaders and methods. Especially great will this confusion become if several changes come in rapid succession. Our enemy of to-day once had a bitter example of this. In the Prussian council of war held on October 5, 1806, Scharnhorst made the wise statement that in war it matters not so much what is done, but that it should be done with vigor and unity of purpose. Nobody in the council listened to his advice and the great disaster of Jena followed. The confusion resulting from changes in methods and plans is now so clearly seen that Prince Hohenlohe's statement "that it is much more important to adopt some clear, fixed plan than to spend time trying to choose the very best and so to be constantly changing" is accepted as an axiom by all military thinkers.

The change of leaders has the disadvantage that it will require some considerable time before the new leaders will become thoroughly familiar with the situation and their duties. New leaders also have the tendency to originate a new policy and make unnecessary changes. I think Frederick the Great expressed this idea very forcibly: "Every minister disapproves of the actions of his predecessor, and makes changes even if they are quite unnecessary, wishing to originate a new policy, which often is harmful. He is succeeded by ministers who hasten to overthrow the existing institutions to show their ability. Confusion, disorder

and all the other vices of a bad administration arise, and worthless officials blame the multitude of changes for their shortcomings." Thus you may see that all changes have a certain inherent disadvantage, which exists until the new leaders have become familiar with their duties and all their subordinates have learned the new methods.

The second principle which I wish to demonstrate is that criticism made with the object of forcing changes has in itself the effect of revealing the situation of our forces and our future plans to the enemy. Criticism is worthless unless certain important secret matters are brought out for the public to see. As everything important is kept secret in war, some confidential information must be disclosed. The leader criticised also will feel that he must answer the charges brought against him, and to do this he must disclose important data and give very optimistically his plans for the future. You will admit without argument that it will be a grave disadvantage to give all this information to the enemy. Secrecy is one of the keys to success in war. The student of Napoleon knows how important this great master considered it to deceive the enemy as to the number of his troops and his plans for the future. Stonewall Jackson imitated the methods of Napoleon in this respect and you know what fear he inspired in his opponents. Whenever nothing was heard of him for a few days, the Northern generals all began to worry as to where he would turn up next. In this war you have seen great attacks succeed when they were made before the enemy could concentrate his troops to meet them, and you have seen them break down when they were advertised in advance.

There is another bad effect in advertising our plans in advance. The advertising agent is always a little too optimistic. He overestimates what can be done in a given time. Then when we fail to carry our plans into execution as advertised, the enemy has an opportunity to make sarcastic references to "American Advertising" and "American Bluff." This has no good effect, as our citizens and our allies lose confidence in the leader who has made these dangerous predictions, while the enemy is correspondingly encouraged.

Few people realize what an important thing public opinion is in war. It is a matter of the greatest importance to keep the people in a confident, optimistic, but not overconfident, mood. General

Grant paid much attention to this point. When he was planning his great attack in the spring of 1865, his official orders gave very limited objectives, so that if he could gain any advantages at all, he could claim success. He informed Sheridan, however, that these orders were merely a "blind," and that the real object was the total defeat of the Confederates. Had he not succeeded in this, he could have published his orders, claimed a success and retained the confidence of the people. Thus, if you have to make predictions, be careful to make very moderate ones, which you will be sure of fulfilling. If you improve on your prediction the people will be even better pleased.

A third principle is that in criticism you charge the leaders with inefficiency. In doing this you give encouragement to the enemy and you discourage our own people. You also undermine the confidence of the soldiers in their leaders, a thing which General Kuropatkin so bitterly complained of in the Russo-Japanese War. Unless an army or a navy has confidence in its leaders, you can expect nothing from it in war. Napoleon said: "The soul of every army is in the honest attachment of all its parts to its leader." Thus, if the leaders remain despite the charges made against them, their position will be weakened greatly and they cannot expect the same cheerful obedience as before; if they are replaced by new ones, it will be realized that the charges of inefficiency were proved, and the soldiers will know that this condition cannot be changed immediately. Also, everything pertaining to the old system, even if good, will be under suspicion.

I now wish to point out a fourth disadvantage. The President is the commander-in-chief of the country in wartime. You can realize the difficulty of his task. The French General Desaix said: "The chief command of an army is the most difficult thing on earth; it is the one work above all others which requires the display of the greatest number of qualities in a given time." I think, however, that Desaix should have gone a little farther, for I believe that the command of a great country in war is even more difficult than that of an army, complicated as that may be.

Now it is inconceivable that our President should be changed during a war, unless at the end of his term of office, and even this is not likely to occur. Thus all that a critic may expect to accomplish with reference to the President is to force him to change his methods of prosecuting the war. Such a procedure

is very dangerous. Many years ago the Italian thinker Machiavelli gave the solemn warning: "Let only one command; several minds weaken an army." A few centuries later Napoleon repeated this statement: "I am of opinion that it would be better to have one bad general than two good ones." If these statements are true for an army, how much more do they apply to a great country. But in our country it would not be a case of two leaders, but perhaps of fifty or a hundred, each one forcing his views on the President. If this were to be done, the leaders would not only have to draw up the plans, but would have to waste the greater part of their time getting them approved and answering the objections of others. Who would like to have the President in the deplorable position of Pitt during the Napoleonic Wars, when he had to fight a political war in Parliament in the daytime and draw up his plans against the foreign enemy during the night?

Thus it will be seen that criticism with the object of forcing a change in leaders or methods has the following evil effects:

1. The confusion due to changes in methods and the unfamiliarity of the new leaders with their duties.
2. The disclosure of secret data and plans to the enemy.
3. The weakening of the confidence of the citizens and soldiers in their leaders and the corresponding encouragement of the enemy.
4. The hindering of the commander-in-chief in carrying out his plans, or the formation of a divided command for the prosecution of the war.

Before attempting to cause a change in leaders or methods, a citizen should decide whether the improvement caused by the changes will be sufficient to more than counterbalance these four disadvantages which the changes will cause. You will therefore see that changes must not be made unless some really important improvement may be expected. A leader must not be displaced by one who is only slightly better, and a method must not be displaced by one which will give only a slight improvement.

In order to make an estimate as to what improvement may be expected from a change, the leader must be in a position to pass judgment upon the present leaders and methods. Napoleon very correctly said: "It does not do for those who are not behind the scenes to pass judgment on the way the strings are pulled." Therefore, the critic must be behind the scenes; he must know all the

secret facts which are in the possession of the leader he is taking to task. Those who are not in this position to make a fair and impartial criticism must not attempt to pass judgment upon leaders. An especially reprehensible procedure is the obtaining of information reflecting upon leaders from their subordinates. This was done in the case of General Burnside in the Civil War. His subordinates gave information to politicians and succeeded in having him replaced by General Hooker, who himself had an important part in this intrigue. So bad were the conditions in the Army of the Potomac that Lincoln wrote to Hooker: "I much fear the spirit which you have aided to infuse into the army, of criticising their commander, and withholding their confidence from him, will now turn upon you. Neither you nor Napoleon, if he were alive again, could get any good out of an army while such a spirit prevails in it."

Suppose now that the critic is one of the few favored persons who can see behind the scenes. Even then it is difficult to pass judgment on the administration of the country. It is true he may discover mistakes, even in considerable numbers. But this in itself proves nothing. Did not Napoleon say that he had made so many mistakes that he no longer blushed for them. Every critic should ponder the wise words of Prince Hohenlohe: "As a young subaltern I learned under clever teachers to laugh at the stupid mistakes of great leaders, but I cannot say that it did me much good. If Frederick and Napoleon made mistakes, it only shows us that strategy is not so easy in practice as it seems. Even with lesser lights we only learn from their errors that all make mistakes, and that they will always be made. For the best is he who makes fewest." Therefore it is manifestly unfair to point out isolated mistakes, even in considerable numbers, and to elaborate them at length. Also mistakes made some time in the past cannot fairly be considered. Often inferior leaders have improved with experience until they became moderately efficient. General McClellan is an excellent example. Although never a brilliant general, he made a gradual improvement, learning from his errors. It was therefore probably a mistake to have relieved him, for he was perhaps the best one of our generals in the East who had been experienced in the leading of large forces. He was judged by his early mistakes and his later and better work was not given suffi-

cient weight. Thus the critic must make a broad estimate of the efficiency of the present methods and leaders, giving due weight to the difficulties under which they labored and to the fact that, in a great organization, great numbers of mistakes must always be expected. Then he must decide whether the changes he proposes will improve the situation. Will they improve it sufficiently to counterbalance the disadvantages of the change and the criticism which must be used for putting it into effect?

If he can answer this question in the affirmative, he must next see whether he has a reasonable chance of effecting the change. For if he is unsuccessful his efforts will have no good effects, while they will still have practically all of the disadvantages enumerated above. Unless, therefore, he has excellent chances of gaining his point, he should refrain from criticism until such a time as he has the chances in his favor.

As a result of this discussion, I have arrived at the following conclusions:

1. A patriotic citizen must realize all the bad effects of criticism and of the changes he expects to effect by means of it.
2. After learning all the facts, he must estimate the efficiency of the present leaders and methods impartially and broadly.
3. After a careful study, he must make a cautious prediction as to the efficiency of the government under the new leaders and with the new methods he proposes.
4. He must then decide whether the improvement in the national efficiency caused by the changes will more than counterbalance the disadvantages caused by them and the publicity used in gaining them.
5. If he can answer this question in the affirmative, he must decide whether he is reasonably certain of being able to effect the changes he proposes.
6. If he is certain of this, then—and only then—will he be justified in his criticism of the government. Only then will he be making it through real patriotic motives.

If our political leaders will apply these tests and make these estimates before launching their attacks on the government, I believe our national efficiency will be greater and our country stronger. This means that the time required to decide the war in our favor will be shorter and our expenditure of lives and treasure less.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

HINTS ON PURCHASING

By Pay Director Frank T. Arms, U. S. Navy,
Supply Officer, Navy Yard, Portsmouth, N. H.

Saving half a million dollars for the government would be considered noteworthy under any conditions. Saving this sum, and at the same time obtaining production in quantities that could not be secured from any known source is more remarkable under existing war conditions. I will endeavor to relate, as briefly and clearly as possible, how both these results have been accomplished during the present war.

More than a year before the declaration of war, the Portsmouth navy yard was designated as the manufacturing and supply yard for nearly all navy standard electrical wiring and lighting appliances. Previous to that time these appliances had been obtained from two or three sources, at prices which now seem exorbitant. With the beginning of the war, demands on the Portsmouth yard became so great that no hope could be held out of filling orders in any reasonable time. The capacity of the plant at Portsmouth, and that of all other manufacturers who were familiar with the work, was far from sufficient to meet the vastly increasing needs of the naval service.

The time required for delivery by outside parties was so great that they could not be considered, varying from four months to nine months. Had the time stated for delivery by these concerns been anywhere within reason, the chances are that the business would have been placed with them at the high prices quoted, for the navy was then, and is now, in fact, urgently in need of many of the fittings.

An old idea was adopted, that of purchasing the various pieces and parts, made at various mills and factories throughout the country, and having them assembled at the navy yard or in some

private plant. This adaptation of a well-known and long-practiced principle was presented to the Bureaus of Steam Engineering and Supplies and Accounts in June, 1917. Both bureaus promptly approved the suggestion, and directed that immediate steps be taken to try the experiment. The results thus far attained have shown, beyond any possible doubt, that the plan is practicable and economical.

The success of this buying campaign has resulted from the application of four fundamental principles, following all the time the requirements of the navy regulations relative to advertisement, competition, award of contracts, factory inspection, etc. The following are the simple rules that were applied:

(A) Find out what you want and when you want it.

(B) Advertise your needs to the trade in the clearest, plainest manner and secure the widest competition among specialists in the manufacturing world.

(C) Award contracts with the best bidders, to the best advantage of the government; time, quality and price all being considered.

(D) Follow up closely the progress of manufacture by correspondence and personal visits to the plants until inspection and delivery have been completed.

A

One of the greatest difficulties in applying the first of these principles was to ascertain accurately how many of the different kinds of articles were needed. The only figures that could be obtained were the quantities shown by the shipment requests received from the supply officers of other yards. These quantities were taken, probably, from past issues or from estimates furnished by the engineer officers of the yards, or both. Such estimates are bound to be either too high or too low, on account of the unforeseen demands occasioned by sudden calls for repairs. The time *when* the articles would be needed was also problematical. Many items would not be actually required for use for many months; others might be urgently needed before they could possibly be manufactured. But, in the absence of more definite information on this point, effort was made to secure the articles or raw material as early as possible, and the quantities were estimated from what the yards said they wanted.

More care should be given to the collection of such data. Theoretically, it could best be accomplished by preparing a complete stock list showing the number of the various articles required for a new ship and multiplying these quantities by a factor representing the number of vessels to be reckoned on for overhaul. Nothing like a complete equipment would ever be called for, of course, but with a complete stock list as a skeleton, a better perspective of the quantities likely to be needed could be made out. Deductions would be made of the articles that would naturally last during the life of the ship, and allowances calculated for those liable to breakage or wear.

The time when the articles would be required could also be stated with more accuracy if closer attention were paid to this point. The average shipment request calls for a given number of articles needed for stock, "to be delivered as soon as possible." It is inconceivable that 25,000 attachment plugs would be needed at one time. If every yard should give a schedule of delivery dates desired, much better service could be given to all yards.

B

When the foregoing data had been collected, the next step was to tell the manufacturers what was required, in language that could be readily understood. This was best accomplished by forwarding samples to bidders. When this was impracticable, it was found that the next best move was to describe the article fully in such a way as to attract the attention of the manufacturer; this in addition to forwarding the blue-prints with proposals. The importance of supplying samples to prospective bidders cannot be overstated. A foundryman, for instance, with a sample before him, can determine how many pieces he could cast in his flasks, what difficulties would be encountered in manufacture, and, what is most important of all to him, the *weight* of the finished product. Without the sample, the estimator is compelled to estimate his weights by computation from the dimensions shown on the drawings. In this event, the bidder naturally figures on the safe side and makes his estimate high enough to be *sure* of making a profit. The buyer pays this excess and frequently pays much more than is necessary. A particular case in point is one to which the Bureau of Steam Engineering invited attention in its letter of

January 28, 1918. In this case, the cost per unit was cut in half, as a direct result of sending out samples.

It may be argued that if a bidder has not the necessary intelligence to figure out his data from blue-prints furnished, he is not the kind of a manufacturer with whom the navy desires to do business.

No greater mistake was ever made. Hundreds of little foundries and machine shops are perfectly capable of doing work, up to the capacity of their equipment, as well as a large concern with its staff of draftsmen, experts and officials, all of which tend to increase overhead expenses. Often the highest efficiency is found in the little, so-called "one-horse" plants. It has been found that it pays the government well to take the trouble to describe the articles to be purchased in such a way that any mechanic can easily understand what is wanted. It secures greater competition and lower prices. Recent openings at the Portsmouth yard brought in twenty to twenty-five bids on classes covering 12,000 pieces of brass castings weighing about one pound each. From former experience, it is believed that not more than one-third this number of bidders would have taken the trouble to make quotations, had the samples not been available for examination.

C

After bids have been opened it has been found best to investigate the standing of the bidder, if he be a new one, and ascertain the capacity of his plant as well as his experience in doing similar work. Neglect to do this has resulted in delays and disappointments when the delivery date fell due. In the present war emergency, too much importance cannot be placed on the necessity of looking carefully into the responsibility of contractors. The best bidder is not *always* the lowest. Price, time and quality all have to be considered in making award, and in these times the shortest time of delivery sometimes outweighs the consideration of price. The matter of quality is usually settled by the specifications, if properly drawn, and, therefore, the early delivery is usually the most advantageous, if the price is within reason. In nine cases out of ten, a person who has long been trained in thinking of the low bidder as the only one to be considered, finds it difficult to readjust his reasoning so as to decide whether or not the longer time quoted for delivery will be an advantage to the enemy.

In more than ninety-five cases out of a hundred, however, the lowest bidder is found to be acceptable. Experience has shown that even the long-time bidder is usually willing to shorten his time for beginning deliveries, when specially requested to do so. Early partial deliveries will, in nearly all cases, answer the essential requirements of the situation, so that the general idea of competitive bidding is proved to be one of the principal factors in securing the results that have been accomplished. This demonstrates the wisdom of the general policy of the Bureau of Supplies and Accounts as outlined by the Paymaster General in his "Intra-Bureau Order" No. 42 of October 12, 1914, which is incorporated here in full:

NAVY DEPARTMENT,
BUREAU OF SUPPLIES AND ACCOUNTS,
WASHINGTON, D. C.

INTRA-BUREAU ORDER NO. 42

October 12, 1914

To: Contract, Requisition and Supply Sections.
Via: Assistant to Bureau and Civilian Assistant.

1. The following injunctions will govern the handling of all requisitions, awards and recommendations as well as correspondence thereto pertaining:

a Go slow on waiving competition, even in cases where it is permissible. No matter how lenient the law or regulations in the case may be, get competition always unless manifestly contrary to the Government's best interests. Err, if at all, on the side of *public competition* (with emphasis on both words).

b Stand by the lowest bidder whenever possible. Having practically a vested right to the award until it is affirmatively established that his bid is defective in some essential respect, he is entitled to just a little more consideration than anybody else—or, rather, to full and fair consideration *before* anybody else. It is, therefore, entirely inappropriate to compare his offerings on an equality with his higher-priced competitors for the purpose of deciding *which is preferable*—the only question to be decided being as to whether his offering is satisfactory (in which event, all others are automatically rejected). After the lowest bidder has been disqualified for valid reasons, then the bidder next above him takes his place and succeeds to all his original advantage of position. And so on until, possibly, the highest bidder may eventually become the lowest acceptable bidder. But the process needs to go step by step through each intervening bidder (and it will not often occur).

c In all these dealings it is to be borne in mind that bidders' rights are not necessarily in conflict with *the Government's interests.* On the contrary, it is the best public policy imaginable to accord to every business man the maximum of consideration—provided, of course, the interests of the United States are carefully and constantly safeguarded.

2. It is scarcely necessary to add that contractual rights carry with them *contractual obligations* on both sides; and one of these obligations resting upon the Government and all its servants (including us) is to help every contractor to *make good if he can*—no matter who he is or what he has undertaken to furnish, because, once he gets a contract, he ceases to be a competitor (to be critically compared with other aspirants for that particular order), but becomes to all intents and purposes a fellow-servant of and co-worker for the Government so long as his good faith and well-directed work hold out.

3. Whatever else you do, *never keep anybody waiting* for information or action that he has a right to expect. Government "red tape" is never objectionable to honest men except when it is needlessly wound up so tight and so long that it results in obstruction; and it is a fact (beyond question, much less contradiction) that every avoidable delay is bound to cost the Government money in the long run. Therefore, first know you are right and then *do it now!*

McGOWAN

D

The contract having been let to the best bidder, all things considered, it becomes the supply officer's duty to keep in close touch with the manufacturer of the articles to be purchased. He should know the progress of the work in the factory, the status of the raw material supply and tool equipment, and should render any assistance in his power to enable the manufacturer to make good on his promised date. In time of peace it could be said that such details are "up to the contractor." Now such an attitude cannot be taken. Any action that the navy fails to take towards assisting the contractor in obtaining raw materials, tools, or prompt inspection of the finished product is a help to the enemy by placing our own forces at a disadvantage.

The various factories at work for the navy are visited almost daily by representatives of the various inspection officers. These men can report to the supply officer as to the progress of work and on many other matters of importance in the final result—delivery. An article 95 per cent completed is of no more use to the admiral in command of the fleet than one 5 per cent complete. Hence the continued necessity of following up the work as it progresses through the factory, wherever that may be.

It is easier, of course, to give an order to a contractor for a complete article and leave to him the responsibility of manufacturing or purchasing and assembling the integral parts. Heretofore, the government has been compelled to let out this detail work

owing to lack of technical and clerical help. The cost-plus contract idea is merely paying a firm to look after details which the government cannot do for itself for lack of experienced men and equipment. To handle the detail work of the scheme under consideration requires a great deal of hard work. The purchase of 10,000 switches and receptacles, drawing 1999-L, made necessary sixteen separate purchases, in addition to the assembly work, with the usual competition in every instance. This may sound absurd, and may be considered to involve too much work and trouble. However, by this complicated method of getting the completed article, the government saved *two dollars* on each switch and receptacle, when compared with the last formal bid received from outside manufacturers. This tends to show that by purchasing completed articles of this description, the navy has been working under a cost-plus system of something like cost plus 100 or more per cent, the profit being given to the man who handles the details; and it tends to show, further, that the navy can, by perfecting an organization, obtain wonderful results, provided it looks after the details, or, in other words, does its own jobbing.

It is likely that the navy would have continued to pay the old prices to outsiders, had they been able to make deliveries on time, but the promised delivery dates of from six to nine months were the best that could be obtained. In other words, the contractors forced the government to go into the jobbing business on its own account. The result has been so satisfactory that the old high prices will probably never be paid again.

The figures given in the following table show in column (1) the quantities of the various articles that have been ordered; in column (2) the final costs of the assembled fittings. These prices are taken from the official records of the supply department at the Portsmouth yard, and they include assembly charges, except for certain items where the assembling costs have not yet been determined. Allowances have been made to cover this expense. In column (3) appear the unit costs of the same articles according to the latest purchase prices or bids received from outside sources. These figures also are taken from the official files of the supply department. Column (4) shows the difference between columns (2) and (3). Column (5) shows the excess costs that would have been paid for the quantities in column (1) if purchased at the contract prices given in column (3):

(1)	Boxes	Dr. No.	(2)	(3)	(4)	(5)
6,000	Branch W. T.	2129-L	$ 1.31	$ 2.10	$ 0.79	$ 4,740.00
7,500	Connection 5-wire	2220-L	2.53	6.70	4.17	31,275.00
5,000	" 10 "	2221-L	7.75	14.40	6.65	33,250.00
3,000	" 20 "	2222-L	12.77	25.20	12.43	37,290.00
1,700	" 40 "	2223-L	18.79	34.20	15.41	26,197.00
700	" 60 "	2224-L	27.78	53.60	25.82	18,074.00
1,800	Dist. 4-way	1961-L	8.85	23.00	14.15	25,470.00
1,000	" 8 "	1962-L	16.95	28.75	11.80	11,800.00
450	" 12 "	1963-L	22.45	34.00	11.55	5,197.50
450	" 4 "	1964-L	16.55	38.00	21.45	9,652.50
225	" 8 "	1965-L	20.18	45.00	24.82	5,584.50
150	" 12 "	1966-L	26.92	47.50	20.58	3,087.00
150	" 16 "	1967-L	32.12	59.60	27.48	4,122.00
700	" 4 "	1983-L	8.82	18.00	9.18	6,426.00
700	" 8 "	1984-L	11.20	24.50	13.30	9,310.00
400	" 12 "	1985-L	16.81	32.00	15.19	6,076.00
3,500	Feeder junction	1954-L	2.69	3.75	1.06	3,710.00
3,500	" "	1956-L	2.69	3.85	1.16	4,060.00
2,000	Fixtures lighting BH	2019-H (without)	1.55	3.00	1.45	2,900.00
200	" " BH	2019-I (with gd.)	2.01	3.60	1.59	318.00
1,000	" " ceiling	21125	3.00	3.90	.90	900.00
2,500	" " deck	2017-H (without)	1.55	3.00	1.45	3,625.00
2,500	" " "	2017-I (with)	2.01	3.60	1.59	3,975.00
10,000	" " "	2715-K	1.725	3.00	1.275	12,750.00
10,000	Guards, BH and Deck Fixt.	2717-L	.875	1.50	.625	6,250.00
10,000	Switch and receptacle	1999-L	1.40	3.40	2.00	20,000.00
30,000	Switch	1999-L	1.29	3.00	1.71	51,300.00
6,000	Shade holders	10206-C	.477	.75	.273	1,638.00
5,500	Push buttons, type G	B-2642-L	.54	2.00	1.46	800.00
15,000	" " " H	"	.64	2.00	1.36	20,400.00
5,000	" " " K	"	.71	2.50	1.79	8,950.00
7,250	" " " J 2"	"	1.38	3.25	1.87	13,557.50
2,250	" " " J 1"	"	1.38	3.25	1.87	4,207.50
5,000	Desk lamps	2149-L	1.53	2.85	1.32	6,600.00
60,000	Sockets, lamp candelabra base	2036-L	.082	.17	.088	5,280.00
					TOTAL,	$408,772.50

In preparing the table shown above, care has been taken to avoid duplication, so that the figures may not be misleading. For instance, 1,000,000 fuse clips and backings have been purchased for $46,000 less than they would have cost at the last formal bid received; 45,000 switch fittings at a reduction of over $40,000 from commercial quotations; and numerous other parts at similarly reduced prices. These savings appear in the lower prices shown for switches and distribution boxes, etc., and, therefore, have been omitted from the table. But many other articles have been bought for which there were no recent contract prices or bids to make comparison, and on which the savings have been proportionate. So that a conservative estimate of the actual reduction in costs resulting from this purchasing campaign, below former purchase prices, would be well over half a million dollars.

It should be borne in mind that the prices given in column (2) are the actual costs after paying each contractor his regular profit. In many instances a dozen or more profits appear in the final costs. The difference is that the government takes the intermediate profit of the assembling company.

The application to the navy purchasing system of the procedure outlined above is past the experimental stage, and the general results are now well established, but still further work along these lines is worth undertaking. Private shipyards doing new construction work for the navy are, or recently have been, paying the same high prices for the articles under consideration as the navy paid a year and more ago. It would be but a short step from what has been done at Portsmouth to assemble the electrical appliances required for destroyers and battleships and turn them over to the shipbuilders, making a corresponding reduction in the price paid for the vessels. It is believed that the shipbuilders would welcome such an arrangement, especially if they were bidding in competition with others. Under the cost-plus system it might be different. But the government, which pays all the bills, should be interested.

An organization might be collected that would be able, without any shop but merely an office force, to make a consolidated purchase of enough electrical stores for all vessels under construction. It means simply a large amount of clerical work under proper supervision.

One destroyer and one large battleship of the *Tennessee* class would require approximately 1420 deck fixtures for a complete new installation. A saving of not less than $1810 could be effected, on this item alone, by the method of purchase herein outlined. Continue this ratio throughout the entire list of equipment required and the result would be such as to more than repay the time and trouble involved.

The one objection to the plan is the length of time required to obtain the necessary competition, factory inspection and delivery. This is not an insurmountable difficulty as delivery has already been made of many thousands of fixtures and appliances.

ADMIRAL GRAVINA.

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LETTERS ON NAVAL STRATEGY

BASED ON THE NAVAL CAMPAIGN OF 1805

(CONTINUED)

By LIEUTENANT HOLLOWAY H. FROST, U. S. Navy

FOURTH LETTER

I. LORD BARHAM'S STRATEGY

We have examined Napoleon's plan of action, the way in which its execution was begun by Ganteaume, Villeneuve and Gravina, and the way in which the English squadron commanders met the situation. But what had the supreme command been doing all this time? To-day please imagine yourself in Lord Barham's office in the Admiralty. Look over the reports which came in to him, estimate the situation from his point of view, and see what you think of his decisions.

In this examination, however, I must ask you to remember one thing. The political conditions in England in 1805 were anything but favorable for the prosecution of a great war. William Pitt, as Prime Minister, had assumed the complete direction of the war. All day he fought against his political enemies in Parliament, and all night he drew up the plans for the operations against the foreign enemy. On the very day when Villeneuve entered Cadiz, a violent political attack had been made on Lord Melville, the First Lord of the Admiralty, and he had been forced to resign under fire. England would have had to pay dearly for such an outrageous proceeding, had not Pitt been a man of marvelous resolution, and had there not been available for the position of First Lord a man of remarkable ability, Sir Charles Middleton, who was over 80 years old. It was only after a tremendous struggle that Pitt succeeded in getting this man temporarily appointed to this important position. To comply with the rules, Pitt finally persuaded the insane king to grant him the title of Lord Barham.

It was in the midst of this confusion that Craig and Knight sailed from Portsmouth on April 17. On April 25 the first news of Villeneuve's passage through the Straits reached England, just at the very time that Barham was moving into his position.

The frigate *Fisgard* was refitting at Gibraltar on April 9 when she saw Villeneuve pass through the Straits. Captain Kerr, her commander, at once hired a brig to send to Nelson. This arrived, as we have seen, at a very opportune time. Kerr then put to sea in his own ship, although she was by no means in fit condition, gave the news to one of Calder's frigates on the Finisterre rendezvous—this shows why Orde met no cruiser there—sent a privateer to Plymouth, and himself went to Cork, giving the word to Gardner's frigates as he passed. This was a fine piece of work.

On April 25 the news reached the Admiralty, being thus 16 days late. Information obtained from spies indicated that the expedition was bound for Jamaica. Such information is as often wrong as right, and when you have such a master of deception as Napoleon for your opponent you have but one guess in five or six. Even to-day we have no real proof as to what many of Napoleon's plans really were. At any rate, the Admiralty commenced by ordering Cochrane, who had left in pursuit of Missiessy, to hurry to Jamaica, if Villeneuve headed anywhere in that direction.

The sum of the Admiralty's information was that Villeneuve had passed through the Straits with 11 units. But they could certainly assume that Orde would be driven off and that Gravina would join Villeneuve with about seven units, bringing up the force of the combined fleet to 18 units.

The first thing for the Admiralty to have done was to have examined all the courses of action open to the enemy and to have determined beyond a reasonable doubt their destination. There were, as we have seen, four most probable ones:

1st. The Channel, via Ferrol.
2d. The Mediterranean.
3d. West Indies.
4th. India.

To begin with, you would be justified if you left India out of the problem for the time. Also there would be no use for you to issue orders about operations in the Mediterranean, because if that had been the destination of the combined fleet, Nelson would have settled the question a month before your orders could reach him.

But you would have to consider very carefully the situations which would arise in case Villeneuve were to go to Ferrol and Brest, or to the West Indies. You might be tempted to say that you could omit from consideration a move into the Channel, because Villeneuve could travel almost as fast as the *Fisgard* and could therefore have beaten Calder at Ferrol or have entered the Channel before your orders could have been written, and that in this case Calder and Gardner would be forced to solve the problem for themselves. But French and Spanish ships travel slowly and then too Villeneuve might have made a detour into the Atlantic to fool you into thinking his destination to be the West Indies, and in this case there would be time for you to prepare for his reception. The most logical way to do this would be to use the nine units in first reserve to bring Calder's force up to about 19 units and to retain 25 units before Brest. Now you might order Orde and Nelson to the Channel, retaining them there until it was certain that this was not Villeneuve's destination, or you might order them to the West Indies, if you thought you would hold the Channel without them, thus clearing up both of the most probable moves of the combined fleet at the same time. Your order would contain a statement that these provisions were to apply only in the case where there was no news of Villeneuve, because, of course, if Nelson knew his destination, it would be proper for him to follow, no matter where the chase led.

Now what did the Admiralty do? First, Barham assumed that the reports of his spy were accurate and based all his orders upon the assumption that Villeneuve had gone to the West Indies. This he took as an absolute fact. His general plan, therefore, must be to reestablish the English superiority on the West Indies station. The enemy forces there, Villeneuve and Missiessy, had 24 units. His own forces there, Dacres and Cochrane, had 11 units. Therefore he must send a reinforcement of at least 13 units. It was logical that this force should be composed of ships taken from the stations from which the enemy squadrons had disappeared. As Barham assumed that Nelson would follow Villeneuve through the Straits, he counted on 22 units being available between St. Vincent and Gibraltar:

Nelson	13 units.
Orde	6 units.
Knight	3 units.
	22 units in all.

Of this number the Admiralty assumed that Nelson would send a force after the combined fleet at least equal to it in numbers. But in case this, for some unforeseen reason, could not be done, the Admiralty issued the following:

CAMPAIGN ORDER NO. 3. APRIL 25

1. Assumption—The combined fleet on its way to the West Indies.
2. General plan—To reestablish the English naval superiority in the West Indies.
3. (a) Nelson to send in pursuit of the combined fleet to the West Indies a force equal to it, this force to be composed of ships from his own squadron and the detachments of Orde and Knight.
   (b) Orde to have any remaining ships, to watch Cadiz and Carthagena, and to escort Craig's convoy to Malta.
   (c) Nelson to come home on sick leave already granted.

This order was received by Knight and Bickerton, but was not received by Orde and Nelson.

Two days after issuing this order the Admiralty wisely decided that it could not count on the fact that Nelson would be available for executing this order. To cover the case in which Nelson would be delayed in leaving the Mediterranean, it was decided that a detachment from Gardner's squadron should be used. As Gardner had at this time but 29 units, as against Ganteaume's 24, it was evident that he could not detach a force equal to that of the combined fleet. The best which could be done was to send a small squadron, and meanwhile to make great exertions to equip the ships in the home yards so as to make up for the dangerous shortage. Accordingly the Admiralty issued the following:

CAMPAIGN ORDER NO. 4. APRIL 27

1. Assumption—The combined fleet on its way to the West Indies.
2. General plan—To reestablish the English naval superiority in the West Indies.
3. (a) Gardner to detach Collingwood with one three-decker and four two-deckers.
   (b) Collingwood to proceed to Madeira, where two frigates had been cruising, to get information.
   (c) If he heard for certain that seven ships had gone in pursuit of the combined fleet, he was to return to Brest.
   (d) If a lesser number had passed, or if his information was of doubtful value, he was to go to Barbadoes in the West Indies, join Cochrane and bring the enemy to battle.
   (e) Nelson, if he had sent no ships to the West Indies, was to send Knight with his three units.

This order was received by Gardner and Collingwood, but not by Nelson. It is interesting to note that Nelson on his passage to the West Indies stopped at Madeira, and thus if these orders had been carried out Collingwood would have received word of his movement with 10 ships and consequently have returned to Brest. Had Nelson not gone to the West Indies and had this order been executed the English would have collected the following forces in the West Indies:

Dacres	4 units.
Cochrane	7 units.
Collingwood	6 units.
Knight	3 units.
Total	20 units.

This order is a further proof that the Admiralty had not considered a movement of the combined fleet toward the Channel, because six units were being sent away from this area. Thus far Barham was firmly convinced that Napoleon's plan was nothing more than a colonial expedition.

He was soon to change his opinion. It was on April 30 that Orde's report arrived. In this report Orde had stated that it was his opinion that the combined fleet was bound for the Channel. This intelligent estimate of the situation on Orde's part convinced Barham that a move toward the Channel must certainly be taken into consideration.

In addition to this statement of opinion, Orde's report contained important facts: First, he had been driven off from Cadiz, which was what the Admiralty might have expected. Second, he was retiring at full speed on Gardner, a move which the Admiralty had not considered as even possible. Again, the report contained the opinion of *Renown's* captain to the effect that Nelson was believed to have gone a second time to Egypt.

Thus both Orde and Nelson would be off their stations. What would be the result of this? Orders had been sent out from England, just a few days before the military convoy had sailed, instructing all commanders to safeguard the convoy through the stations which they commanded. Orde made no mention of these orders and thus it was practically certain that he had not received them. Nelson would likewise fail to receive them, and Craig and Knight were heading directly for the place, Cadiz, where Ville-

neuve had been last reported. And the worst of it all was that the news was already 20 days late and that it was almost surely too late for the Admiralty to do anything, as any orders issued to squadrons other than the Brest squadron would almost surely arrive too late to be of any use.

Nevertheless Barham set to work to do what he could. Let us see how he estimated the situation. First, it was evident that the situation in European waters would have to be cleared up before anything could be done in the West Indies and thus Collingwood's orders ought to be cancelled. This could be done in time. Now, this done, we enter into the realm of pure theory. Barham had two missions:

1st. To protect the convoy.

2d. To repulse a movement of the combined fleet into the Channel.

The danger point for the convoy lay between St. Vincent and Cadiz. If it had not reached this point, it should be sent home until the air had cleared. If past this point, it should naturally be sent on with all speed to Malta.

Now provisions had to be made for a move of the combined fleet to Ferrol and the Channel. In case the enemy were to make such a move he would first go to Ferrol, to call out the 11 units in port there. Thus the first line of defence for the Channel would be Calder's squadron there. He had at that time seven units, and it was evident that he must be reinforced. Orde and Knight could give him nine more units, making him 16 units in all.

This line of 16 units against 18 of the combined fleet and 11 more in Ferrol was rather weak, especially as Villeneuve might get into Ferrol without fighting, as he did later in the campaign. Therefore the second and main line would be the Brest squadron of 29 units. If the first line was forced, it would withdraw and rally on the Brest squadron. This would give Gardner 45 units. To these he might add five in first reserve and in case of emergency the nine of Keith's force, giving him a grand total of 59 ships, in a position between Villeneuve in Ferrol with 29 and Ganteaume in Brest with 24.

In accordance with these decisions, Barham issued the following:

CAMPAIGN ORDER NO. 5. APRIL 30

1. Assumption—Combined fleet on passage toward the Channel.
2. General plans—First, to safeguard the convoy. Second, to repulse a movement of the combined fleet toward the Channel.

To carry out the first plan:

3. (a) Calder to send home the convoy under cruiser escort, if it had not passed his station.
   (b) Knight to send the convoy back to Calder if it had not passed St. Vincent.
   (c) If it had passed Cadiz safely, Knight to send it to Malta under cruiser escort.

To carry out the second plan:

4. (a) Orde to join Calder.
   (b) Knight to join Calder.
   (c) Orde to command the three united squadrons at Ferrol.
   (d) If he did not believe it possible to hold the Ferrol position, Orde had permission to fall back on Gardner.
   (e) If the Ferrol concentration could not be made, Orde, Knight and Calder were to retire automatically on Gardner.
   (f) Collingwood to remain with Gardner.

We will notice that this order, both in its details and in its general spirit, was radically different from the two previous orders. Just as in land warfare it is the most difficult problem to disperse for living and marching and to concentrate for fighting, so in maritime warfare it is the most difficult problem to scatter to protect commerce and to concentrate for battle. Napoleon's forces had been scattered for operations against English commerce, and the English, to protect their commerce, had been forced to scatter likewise. Barham first believed that Napoleon's plan was to attack the West Indies, and consequently when he heard of Villeneuve's escape, his first orders provided for a further dispersion of the English squadrons. Then Orde's dispatch forced him to realize that there was a strong possibility of the French concentrating in the Channel for battle, and Barham felt constrained to follow Napoleon's lead and concentrate the English squadrons for fighting, at the point at which he considered it most probable that Napoleon would strike. Thus Barham by this one order showed that he meant to shift from a wide disperson to a close concentration.

This gives me a chance to discuss the effect of a counter-order. You will remember that only three days before an order had been issued for a concentration in the West Indies; that is, a wide dispersion of force for commerce protection. Now an order was

sent out to concentrate in the Channel for fighting, exactly the opposite of the former order. It would take anywhere from two days to several weeks to deliver the two orders to the various squadron commanders. Thus, at any time, some would be executing one order and some the other, which would soon lead to a condition of "ordre, countre-ordre, desordre." However, there seemed to the Admiralty to be an urgent necessity for changing the plan, and I think you will agree that the last plan was the more logical of the two. Thus you have to decide whether the second plan is sufficiently better than the first to compensate for the confusion a change in the plan is certain to cause.

But I fancy I can hear you say, "What is the use of issuing such an order, if the squadron commanders cannot receive it in time?" and if it cannot be received by some squadron commanders for several weeks, "will it not be injurious for the Admiralty to try to tell the commanders what to do some time in the remote future, when the entire situation may be wholly changed?" I must admit that it is difficult to find an answer to these questions, except where they apply to the order to Collingwood to remain at Brest, which order could be transmitted very quickly. The only answer to your first question I can think of is that the Admiralty realized that the chances were greatly against the orders being received in time, but issued them to cover the remote possibility that, due to some delay of Craig's convoy or of the hostile squadrons, the situation might remain unchanged and the orders be received in time. The only answer to your second question is that the Admiralty believed that each squadron commander would look upon the orders merely as general instructions and would not hesitate to modify them or act directly contrary to them should the situation at the time of their receipt be so changed from that which the Admiralty assumed at the time they were issued as to demand it. It is only by looking at them in this light that I can find any justification for them. As a matter of fact, no squadron commander, save Collingwood, received them until the Admiralty had changed its opinions of the situation four or five times.

But while this order was thus never received by the squadron commanders, it is interesting to note that they acted almost as though they had received it by radio a few hours after it was issued, so soundly was the naval doctrine implanted in the service. We have seen how Orde retired on Calder, as the orders required.

When he found Calder off his station—as a matter of fact, Calder must have been close at hand—he then retired on Gardner, as the orders required. Calder, however, did not retire, as he believed that he could retire without loss on Gardner, should the combined fleet appear. Knight was on the point of sending on the convoy to Malta, but he was going with it with his fighting ships, because the Spanish Carthagena squadron was ready for sea, a fact which the Admiralty could not have known when it directed the convoy to be sent on under cruiser escort. Also, Orde, if he had known anything about the convoy, would surely have searched for it on his way north, and have brought it with him. Thus although the commanders never received the order, their intelligent initiative, based closely upon doctrine of the service, solved the problem just as the orders, which never reached them, required. This is an excellent example of the use of doctrine in a military service.

Now you would naturally think that the plan of campaign was settled and that after it had been changed twice it would not be again modified without the best of reasons.

But now the situation took another change, as new information arrived. To take up the story, I ask you to remember that one of Orde's cruisers, the *Beagle*, had been stationed at the western entrance of the Straits, and had mysteriously disappeared. This ship had been cruising on her station on April 9 when she saw Villeneuve pass by with 11 units. On the following day she sailed to the westward to rejoin Orde off Cadiz. When off this port she saw Villeneuve's ships standing off to the westward, followed at long intervals by four Spanish ships of the line. With rare good judgment the captain trailed this squadron for all of two days, and on April 12, at dark, when the enemy was still going to the westward, left and went to Calder. Calder sent him on to England. On May 4 Barham received the news. It would seem to me that this news was not sufficiently accurate to indicate any definite destination. The route certainly led in the direction of the West Indies, but in fact it coincided very closely with Nelson's route, later in the campaign, from Gibraltar to Brest. Anyway might not Villeneuve have seen he was followed and purposely led the *Beagle* on a false course? At any rate, the news convinced Barham that Villeneuve knew nothing about Craig, that he was certainly not headed for Ferrol and the Channel, but on the contrary for the West Indies. Barham therefore gave over his plan for a concentration in the Channel and reverted to his original plan to con-

centrate in the West Indies a force capable of meeting the combined fleet on even terms. He therefore issued the following:

CAMPAIGN ORDER NO. 6. MAY 4

1. Assumption—Combined fleet on passage to the West Indies.
2. General plan—To reestablish the English naval supremacy there.
3. (a) Gardner to detach Collingwood with nine units, having discretion to hold the detachment if he received new information not in the possession of the Admiralty.
   (b) Collingwood to proceed to Madeira and act in accordance with information received there. In case of doubt to go to the West Indies.
   (c) Knight to go to the West Indies with his three units.
   (d) Nelson, in case he had not sailed to the West Indies, to detail a force to blockade Carthagena, leave cruisers off Cadiz, and come home with the remainder.

A provision in this order to be noted was that Gardner, if he had any new information, was given permission to cancel the order for Collingwood's sailing. This shows the liberal initiative allowed to the English commanders. It is interesting to note that Gardner had already delayed on his own initiative Collingwood's first order to sail issued on April 27.

Gardner not having any new information ordered the following two-deckers to take on provisions preparatory to leaving with Collingwood in the *Dreadnaught*, three-decker: *Tonnant, Mars, Minotaur, Illustrious, Bellerophon, Ramillies* and *Colossus*. But as the weather was so rough that provisions could not be taken on at sea, he ordered Collingwood to a Channel anchorage, gave him his orders and detached him with the above ships, nine units in all.

Not knowing that Collingwood had already left Gardner, the Admiralty issued the following:

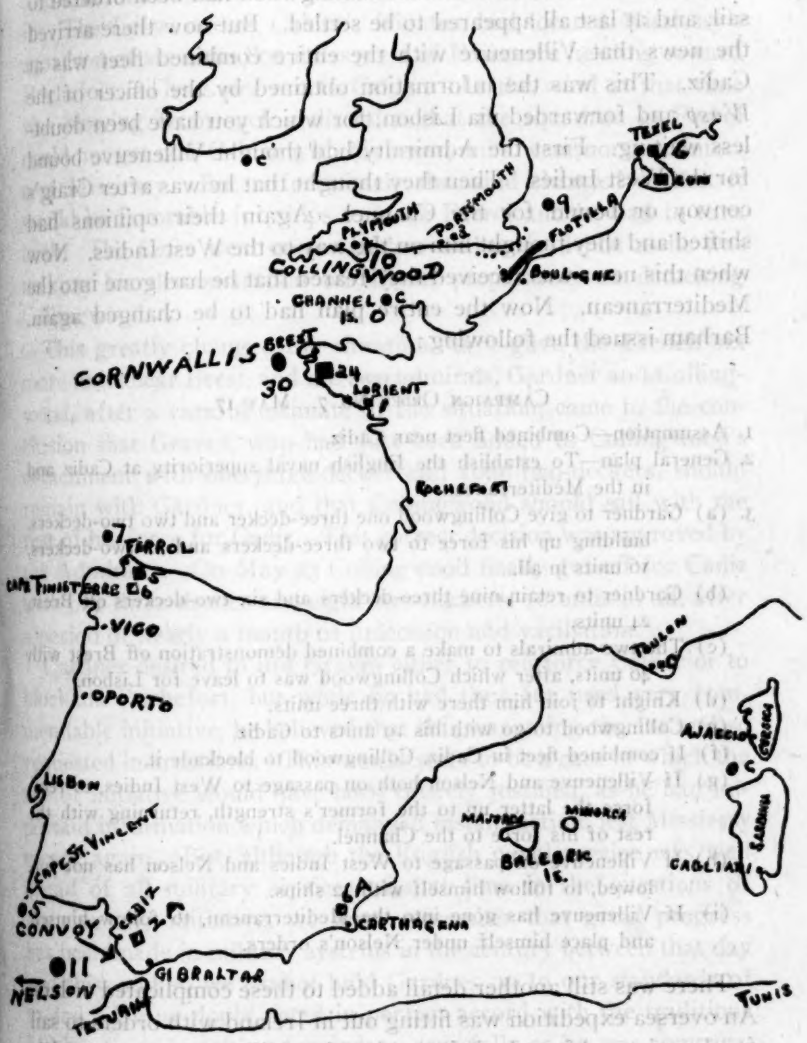
SPECIAL ORDER. MAY 10

1. Gardner to give Collingwood one additional ship, making a total of 10 units.
2. Collingwood to sail immediately for Barbadoes.

Four days later the Admiralty heard that Collingwood had been detached and was in Plymouth ready to sail. The following was issued:

SPECIAL ORDER. MAY 14

1. Three two-deckers ready to sail in Channel ports to reinforce Collingwood.
2. Collingwood to go to Barbadoes with 12 units.



POSITIONS, MAY 12.

Jamaica			9
Leeward Islands	12	6	2
India		1	9
En Route San Domingo to Rochefort			6
En Route Rochefort to Martinique			2

This was the fourth time that Collingwood had been ordered to sail, and at last all appeared to be settled. But now there arrived the news that Villeneuve with the entire combined fleet was at Cadiz. This was the information obtained by the officer of the *Wasp* and forwarded via Lisbon, for which you have been doubtless waiting. First the Admiralty had thought Villeneuve bound for the West Indies. Then they thought that he was after Craig's convoy or bound for the Channel. Again their opinions had shifted and they thought him on the way to the West Indies. Now when this news was received they feared that he had gone into the Mediterranean. Now the entire plan had to be changed again. Barham issued the following:

CAMPAIGN ORDER NO. 7. MAY 17

1. Assumption—Combined fleet near Cadiz.
2. General plan—To establish the English naval superiority at Cadiz and in the Mediterranean.
3. (a) Gardner to give Collingwood one three-decker and two two-deckers, building up his force to two three-deckers and 12 two-deckers, 16 units in all.
   (b) Gardner to retain nine three-deckers and six two-deckers off Brest, 24 units.
   (c) The two admirals to make a combined demonstration off Brest with 40 units, after which Collingwood was to leave for Lisbon.
   (d) Knight to join him there with three units.
   (e) Collingwood to go with his 19 units to Cadiz.
   (f) If combined fleet in Cadiz, Collingwood to blockade it.
   (g) If Villeneuve and Nelson both on passage to West Indies, to reinforce the latter up to the former's strength, returning with the rest of his force to the Channel.
   (h) If Villeneuve on passage to West Indies and Nelson has not followed, to follow himself with 12 ships.
   (i) If Villeneuve has gone into the Mediterranean, to follow himself and place himself under Nelson's orders.

There was still another detail added to these complicated orders. An oversea expedition was fitting out in Ireland with orders to sail for Jamaica. After the information that Villeneuve was in Cadiz reached London, the order for its sailing had been cancelled, but there was some doubt as to whether the expedition would sail before the counter-order arrived. Therefore Collingwood was ordered if he sent any ships to the West Indies to have these ships escort the convoy past Madeira.

But before this order could be executed more information came in. The *Loire,* one of Calder's frigates, had located Missiessy's squadron of six units 800 miles west of Finisterre heading toward Rochefort. The *Loire* ran to Calder. As the wind at that time was blowing from such a direction that the squadron in Ferrol could not get out, Calder with his seven units went north to intercept Missiessy. But unfortunately the wind changed so that it would be favorable for ships to leave Ferrol and he had to turn back. The *Loire* went on to Gardner and arrived just as he was making his demonstration off Brest, preparatory to detaching Collingwood.

This greatly changed the situation, as it gave the French six more units near Brest, and the two admirals, Gardner and Collingwood, after a careful estimate of the situation, came to the conclusion that Graves, who had just been added to Collingwood's detachment with one three-decker and four two-deckers, should remain with Gardner, and that Collingwood should sail with the rest of his force for Cadiz. This correct decision was approved by the Admiralty. On May 23 Collingwood finally got off for Cadiz with one three-decker and eight two-deckers, 10 units in all, after a period of nearly a month of indecision and vacillation.

Gardner desired to use Graves either to reinforce Calder or to blockade Rochefort, but while he had thus far used very commendable initiative, he believed that this was going too far and so requested instructions. This would seem to be a case in which the use of initiative would have been entirely justified, as he had important information which demanded instant action, lest Missiessy escape again. But, although the English naval service was well ahead of all military services of that time in the questions of doctrine and initiative, we must remember that great progress has been made in military systems in the century between that day and this, and so we cannot hold Gardner up to our standards of to-day. He no doubt acted in perfect accord with the traditions of his service in asking for orders, especially as he was comparatively close to the Admiralty and could receive orders in a moderate time.

On June 5 the order was received from the Admiralty to send Graves to blockade Rochefort, and he left for his position just two weeks after the time he would have left had Gardner sent him on his own responsibility. As it happened, the delay had no bad effects, as Missiessy was in no condition to sail. Graves was ordered to follow Missiessy should he attempt to escape.

Missiessy's return, which so weakened Napoleon's operation, had for this very reason completely fooled the English. The Admiralty again tended toward the opinion that Villeneuve had not gone to the West Indies, and even began to fear that he had gone to India. Therefore the Admiralty issued the following:

SPECIAL ORDER. ABOUT MAY 28

1. Collingwood not to send any ships further to the westward than Madeira.

As soon as Graves arrived before Rochefort, he saw that the French ships were in no condition to sail. He had been reinforced by another three-decker, so that he now had eight units in all. Graves therefore advised Gardner that his force could be reduced. Gardner, however, felt that he could not do this without direct orders from the Admiralty, and again asked for instructions. He was ordered to withdraw two ships and use them as he thought fit. Gardner sent them to Calder.

I have already made some comments upon the British Admiralty's system of command at the time we discussed the first counter-order issued by Barham. But this question is so important that I believe it calls for further investigation. Let us first give a summary of the orders given to each squadron commander.

First take the various orders issued to Collingwood:

Date of information upon which order was based	Date of issuing order	Date at which order would probably be received	Substance of order
April 9.	April 27.	April 29.	Proceed Madeira with six units.
April 10.	April 30.	May 2.	Remain with Gardner.
April 12.	May 4.	May 6.	Proceed Madeira with nine units.
April 12.	May 10.	May 12.	Proceed Barbadoes with 10 units of Gardner's squadron.
April 12.	May 14.	May 16.	Proceed Barbadoes with nine units of Gardner's squadron and three units from dockyards.
April 27.	May 17.	May 19.	Proceed Cadiz with 16 units of Gardner's squadron.
May 12.	About May 28.	June 17.	Send no ships past Madeira.

Now take the orders issued to Nelson:

April 9.	April 25.	May 15.	Send an equal force after combined fleet to West Indies; remaining ships blockade Spanish ports.

April 12.	May 4.	May 24.	Blockade Spanish ports with part of force, come home with remainder.

Take the orders issued to Knight:

April 9.	April 25.	May 15.	Take orders from Nelson.
April 9.	April 27.	May 17.	Go to West Indies.
April 10.	April 30.	May 20.	Join Calder at Ferrol.
April 12.	May 10.	May 30.	Go to West Indies.
April 27.	May 17.	June 6.	Join Collingwood at Lisbon.

See what Orde was ordered to do:

April 9.	April 25.	May 15.	Take orders from Nelson and watch Cadiz.
April 10.	April 30.	May 20.	Go to Ferrol and take command.

Calder was ordered:

April 10.	April 30.	May 10.	If Orde did not join him, to retire to Gardner.

How many of these orders were received in time?

Collingwood: Five out of seven.
Nelson: None out of two.
Knight: Two out of five.
Orde: None out of two.
Calder: One out of one. Total: Eight out of 17.

How many were actually carried out?

Collingwood: One out of seven—the one to remain at Brest.
Nelson: None out of two.
Knight: One out of five—the one to go to Ferrol, where the Admiralty did not want him at the time.
Orde: None out of two.
Calder: None out of one. Total: Two out of 17.

I will now ask you to consider the various assumptions made by the Admiralty as to the position of the combined fleet.

April 25.—Combined fleet on passage to West Indies.
April 27.—Combined fleet on passage to West Indies.
April 30.—Combined fleet after Craig or on way to Channel.
May 4.—Combined fleet on passage to West Indies.
May 17.—Combined fleet at Cadiz; probably will go into Mediterranean.
May 28.—Whereabouts of combined fleet unknown; possibly on passage to India.

The English author Corbett holds this system of the Admiralty up to us as a model. I must admit that I am forced to disagree with him. It appears to me that the English made the following mistakes:

1st. Orders were issued which could not be received by the squadron commanders before the situation would have changed completely from that upon which the orders were based.

2d. The general plan was changed too frequently and upon insufficient information, and many counter-orders were issued in rapid succession.

I wish to make clear to you that I do not mean this to be criticism of the English Admiralty. I do mean that if these operations were conducted to-day we would consider that according to our present standard mistakes had been made. But what would be considered mistakes to-day would be considered perfectly correct when judged according to the standard of that time. I might mention that Napoleon himself worked with the same system as did the Admiralty when he attempted to direct the war in Spain from Paris. In fact, there is one instance where Massena received an order which had left Paris no less than three months before.

I must also remind you of the extremely vicious political conditions under which Barham was forced to work. I can easily imagine in our own country how hundreds of politicians would demand that ships be sent to protect their own districts and their merchant shipping. It is extremely probable that Barham had to contend with this sort of a business.

But even if Barham were working under favorable political conditions, consider the tremendous moral power it would require for him to wait calmly for a month for the situation to develop, while all sorts of startling news came in from all sides. If we are ever in such a situation, I hope that the admiral will receive the loyal support of all his subordinates, who will neither criticize his decision, say that it cannot be carried out, nor propose pet schemes of their own.

In concluding this letter I wish to emphasize certain principles:

1st. Seize the initiative whenever possible.

2d. When it is necessary to act on the defensive, go methodically to work and clear up in turn the various courses of action which the enemy may take.

3d. Do not issue orders to a subordinate which cannot reach him until after the entire situation will be changed. If you do issue orders based on old information or which will take a long time to reach the subordinate who is to execute them, tell

him the situation as you knew it at the time the orders were written, and allow him to modify the orders if this situation has changed by the time he receives them.

4th. Always allow your subordinate a liberal initiative, in accordance, however, with a well-recognized doctrine. It was this initiative of the English admirals which prevented any of the evil results which the orders of the Admiralty might have caused.

5th. Do not change your plan or issue counter-orders unless new and reliable information absolutely requires a change.

FIFTH LETTER

I. BICKERTON AND COLLINGWOOD AT CADIZ

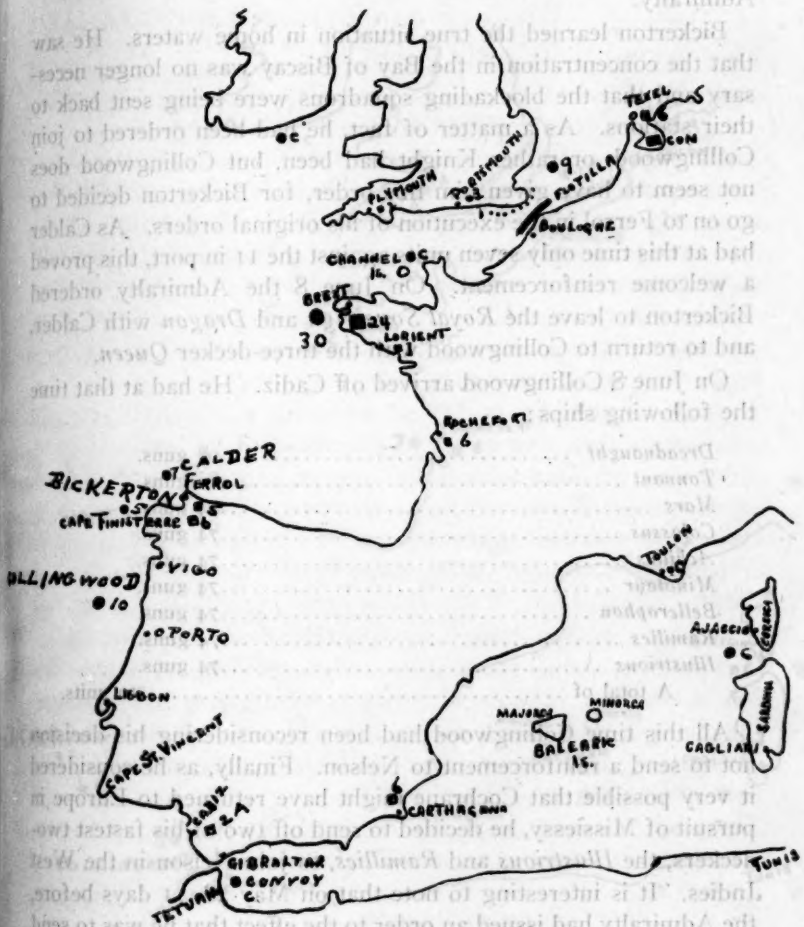
We will remember that when Nelson sailed for the West Indies he left Bickerton in command of a squadron of cruisers in the Mediterranean. Later, Knight with his two ships, the *Queen* and *Dragon*, and the *Royal Sovereign*, which Nelson had given him, escorted the convoy to Gibraltar. Here Bickerton as senior officer took command of the whole. He planned to escort the convoy to Malta and return to Gibraltar with a trade convoy from the Levant.

However, when he was about to sail, he received from the Admiralty the first orders which had been issued after the news arrived of Villeneuve's escape. According to these, if Nelson had gone to the West Indies, as he had, Knight with his two ships was to remain with Orde before Cadiz. This situation gives us an excellent example of the evils which might have resulted from the Admiralty's system of sending out orders. Orde, whom the Admiralty believed to be at Cadiz, was actually at this very date, May 12, in England, and his force had been disbanded. The Spanish Carthagena squadron, which the Admiralty did not believe to be ready for sea, had already made one cruise. If Bickerton were to send off two ships either to try to find Orde or to take Orde's place off Cadiz, then he would have only one ship, the *Royal Sovereign*, to safeguard the convoy on its way to Malta. But where the Admiralty probably made a mistake in issuing orders which covered a period too far into the future, they countered this mistake by allowing in all cases a wide initiative to the subordinate on the spot who was charged with the execution of the orders. It would seem, from Gardner's hesitation to act on

his initiative with regard to Graves' squadron, that subordinates at a great distance were allowed a wider scope in their independent action than were those comparatively near at hand, to whom orders could be sent with less delay. In this case Bickerton acted with great intelligence and courage. He determined to keep both of Knight's ships to escort the convoy to Malta, justifying this modification of his orders by the fact that Orde had left his station and that the Carthagena squadron, unknown to the Admiralty, was actually ready for sea.

Just as Bickerton had arrived at this decision, the second set of orders arrived. These, as you may remember, provided for a great concentration in Bay of Biscay and at the entrance to the Channel. According to them, if the convoy had passed Cadiz, Knight was to take it on to Malta under cruiser escort, sending his two ships back to Calder, or if Calder were off his station, to Gardner. This was part of a great concentration in the Channel. As Bickerton estimated the situation, every ship was needed in the Channel, and therefore he was bound to go there with not only Knight's two ships, but with the *Royal Sovereign* as well. As it would be manifestly impossible to send the convoy on under cruiser escort, it must be held at Gibraltar until further orders. It is a curious example of the confusion which the orders of the Admiralty could have caused, to note that orders were actually on the way for Knight to go to the West Indies. Fortunately, before these orders could get to him, Bickerton had sailed on May 17 from Gibraltar with his five units for Ferrol. On May 27 he met Collingwood off Finisterre coming down to blockade the very Spanish ports he had left. The two admirals were able to exchange the latest information.

Collingwood now learned that both Villeneuve and Nelson had gone to the West Indies, the former with 18 ships and the latter with 10, of which one was a three-decker. As he knew Cochrane had six ships, one a three-decker, this gave the English 16 ships, not counting Dacres with four ships, on that station. As he had orders to reinforce Nelson up to the number of ships in the combined fleet, he should, according to his orders, have sent two ships to reinforce him. However, as Bickerton reported that there were in Cadiz two three-deckers and two two-deckers and at Carthagena two three-deckers and four two-deckers, 14 units in all, he believed that he would need all of his 10 units to hold them in port. There-



POSITIONS, JUNE 15.

West Indies		10
En Route Leeward Islands to Ferrol.	14	6
En Route Leeward Islands to Cadiz		12
India	1	9A
En Route Cadiz to Barbadoes		2

fore, he decided for the present not to send any ships to Nelson, and stood on toward Cadiz. His decision was approved by the Admiralty.

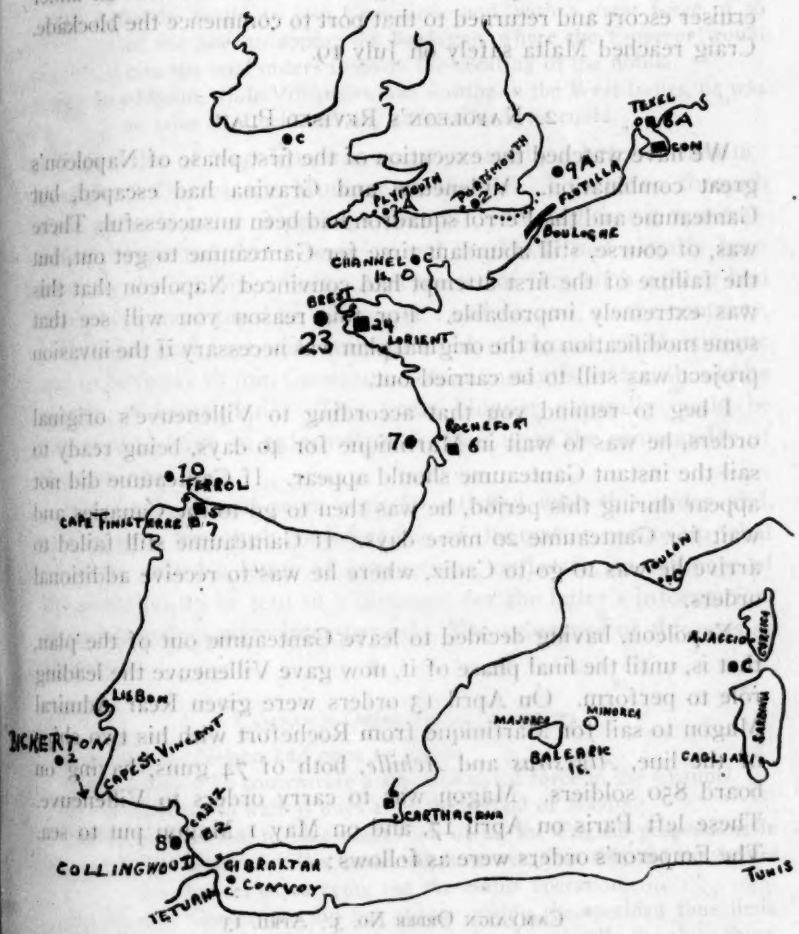
Bickerton learned the true situation in home waters. He saw that the concentration in the Bay of Biscay was no longer necessary and that the blockading squadrons were being sent back to their stations. As a matter of fact, he had been ordered to join Collingwood, or rather Knight had been, but Collingwood does not seem to have given him this order, for Bickerton decided to go on to Ferrol in the execution of his original orders. As Calder had at this time only seven units against the 11 in port, this proved a welcome reinforcement. On June 8 the Admiralty ordered Bickerton to leave the *Royal Sovereign* and *Dragon* with Calder, and to return to Collingwood with the three-decker *Queen*.

On June 8 Collingwood arrived off Cadiz. He had at that time the following ships:

Dreadnaught	98 guns.
Tonnant	80 guns.
Mars	74 guns.
Colossus	74 guns.
Achilles	74 guns.
Minotaur	74 guns.
Bellerophon	74 guns.
Ramilies	74 guns.
Illustrious	74 guns.
A total of	10 units.

All this time Collingwood had been reconsidering his decision not to send a reinforcement to Nelson. Finally, as he considered it very possible that Cochrane might have returned to Europe in pursuit of Missiessy, he decided to send off two of his fastest two-deckers, the *Illustrious* and *Ramillies*, to join Nelson in the West Indies. It is interesting to note that on May 28, 11 days before, the Admiralty had issued an order to the effect that he was to send no ships further to the westward than Madeira.

On June 22 Bickerton rejoined Collingwood before Cadiz with the *Queen*, bringing the total force there to two three-deckers and six two-deckers, 10 units in all. With this force both Cadiz and Carthagena had to be blockaded and Craig's convoy had to be forwarded to Malta. Collingwood divided his force into two equal parts, each consisting of one three-decker and three two-deckers. With the *Dreadnaught*, *Mars*, *Colossus* and *Achilles* he



POSITIONS, JUNE 1.

Jamaica			9
Leeward Islands	12	6	2
En Route Europe to L. I.			2
India	1		9

remained before Cadiz. With the *Queen, Tonnant, Minotaur* and *Bellerophon,* Bickerton went to Gibraltar, brought out the convoy and escorted it well past Carthagena. Then he sent it on under cruiser escort and returned to that port to commence the blockade. Craig reached Malta safely on July 19.

2. Napoleon's Revised Plan

We have watched the execution of the first phase of Napoleon's great combination. Villeneuve and Gravina had escaped, but Ganteaume and the Ferrol squadron had been unsuccessful. There was, of course, still abundant time for Ganteaume to get out, but the failure of the first attempt had convinced Napoleon that this was extremely improbable. For this reason you will see that some modification of the original plan was necessary if the invasion project was still to be carried out.

I beg to remind you that according to Villeneuve's original orders, he was to wait in Martinique for 40 days, being ready to sail the instant Ganteaume should appear. If Ganteaume did not appear during this period, he was then to go to the Canaries and wait for Ganteaume 20 more days. If Ganteaume still failed to arrive he was to go to Cadiz, where he was to receive additional orders.

Napoleon, having decided to leave Ganteaume out of the plan, that is, until the final phase of it, now gave Villeneuve the leading rôle to perform. On April 13 orders were given Rear Admiral Magon to sail for Martinique from Rochefort with his two ships of the line, *Algesiras* and *Achille,* both of 74 guns, having on board 850 soldiers. Magon was to carry orders to Villeneuve. These left Paris on April 17, and on May 1 Magon put to sea. The Emperor's orders were as follows:

Campaign Order No. 3. April 13

1. Assumption as to his own forces—Ganteaume would not be able to escape from Brest.
2. General plan—To concentrate a superior naval force in the Channel.
3. (a) Villeneuve to wait in West Indies for 30 days after receipt of these orders.
   (b) If Ganteaume should appear during this time, then the original plan was to be carried out.
   (c) If Ganteaume did not appear, Villeneuve to proceed to Ferrol, beat the blockading squadron and rally the ships in port.

(d) Then, Villeneuve, commanding the united force, was to attack the English blockading squadron off Brest, in which battle Ganteaume was to assist him if possible.

(f) After the battle, to join Ganteaume and, with a great force of 56 of the line, to appear off Boulogne, where the Emperor would give the final orders to cover the crossing of the flotilla.

(g) In addition, while Villeneuve was waiting in the West Indies, he was to seize St. Lucia and any other islands he could.

This order of Napoleon was accompanied by a letter of instructions from Dacres, the Minister of Marine. This letter, through some gross blunder or perhaps clerical error, said that it was confidently expected that Dominica and St. Lucia had already been taken by the combined fleet. As a matter of fact, such a thing had never been mentioned in Villeneuve's orders, and, on the contrary, Villeneuve had been distinctly ordered to remain at Martinique and to be ready to join Ganteaume on an instant's notice, should he appear at Martinique. This great blunder naturally could be expected to have an extremely evil effect upon the commander of the combined fleet.

Napoleon did not seem entirely satisfied with this order and, after a very thorough consideration of the matter, wrote up what might be called a letter of instructions, or better, an estimate of the situation, to be sent to Villeneuve for the latter's information, in which orders were interspersed. The substance of this was as follows:

CAMPAIGN ORDER NO. 4. APRIL 29

1. Assumption—Nelson had gone to Egypt.

2. General plan—To concentrate a superior naval force in the Channel.

3. (a) Villeneuve to wait 35 days after the arrival of Magon.

(b) In this period, to take possession of all the English possessions in the Lesser Antilles, provided, however, that this did not injure his chances of carrying out the major operation.

(c) In case Ganteaume did not appear within the specified time limit, to proceed to Ferrol as before ordered, and rally the ships there.

Napoleon's estimate of the situation:

Enemy forces—The English have two courses of action after Villeneuve's arrival at Ferrol. These are:

1st. To move Gardner out toward Ferrol, so as to attack Villeneuve, when he should approach Brest, and beat him before Ganteaume could get into action.

2d. To hold Gardner close to Brest, in which case Villeneuve and Guateaume would have better chances of uniting on the battlefield.

Our own forces—In case Gardner took the first course, Villeneuve might go to the Lizard. Then he had three courses of action:

1st. To sail directly into the Channel to Boulogne.

2d. To sail around Ireland and Scotland, join the Texel force, and go to Boulogne.

3d. To slip past Gardner into Brest, in which case he would have 56 ships of the line.

In case Gardner remained close to Brest, Villeneuve would have to fight. He could call in the Rochefort squadron of six units and fight Gardner as near Brest as possible, so he could receive the assistance of Ganteaume.

Finally, in case, for some unexpected reason, none of these measures would be of use, Villeneuve might call in the Rochefort squadron and go to Cadiz, where the Carthagena squadron and new instructions would be waiting for him.

(d) Villeneuve to have perfect independence in the selection of any one of these courses of action.

I think you will admit that this was in every respect a model order. I can find nothing to criticize in it, except that to-day we do not insert an estimate of the situation in an order to a subordinate. As I have said so much about the English sending out orders which could never arrive in time, I fancy that you would like to have me show you that this would arrive in time. The combined fleet left Cadiz April 10. You can allow 35 days for the passage of such a large number of ships. Thus the combined fleet would arrive at Martinique on May 15. It was ordered in the first instruction to wait 40 days. This would make its departure June 24. If Napoleon's order left May 1, it would arrive about June 1, allowing 30 days for the passage of a fast cruiser. Thus there would be 23 days to spare. The order actually arrived 25 days before the date upon which Villeneuve, according to his orders, should have left Martinique. This should conclusively answer your criticism.

Now you may admit that the order itself was drawn up in fine form and that it would arrive in time, but you may say, "Did the plan really have any chances of success?" I must admit that I do not believe the plan gave Villeneuve even chances of success; but if you were to criticize every military leader who undertook a plan in which the chances of success were against him, you would have quite an extensive undertaking on your hands, because there would not be a single great general or admiral who would be spared. Can you suggest for this actual situation a better plan of action? If

you cannot, then I hold that, even if it did not offer very great chances of success, the great results which success would bring justified the risks which would have to be run.

But while the chances were against its success, still there were reasonable chances that it might succeed, especially if it were executed with secrecy and determination. It would be very probable that Villeneuve might fall upon Calder unexpectedly off Ferrol and beat him badly. Then with the 11 ships in Ferrol, he would have a formidable squadron. He would have at least reasonable chances of fighting a drawn battle with Gardner and after it of joining with Ganteaume, and he also had at least some chance of evading Gardner and joining Ganteaume without having to fight. If once he could join Ganteaume, the crossing of the flotilla would be practically assured. Of course, it is easier to talk about all this afterward than to do it at the time, and I will admit freely that Villeneuve had a very formidable task before him, especially with the numerous difficulties he would have to encounter within his own force. Still he would have the initiative on his side, and the enemy, not expecting such a daring operation, might easily make false dispositions of which he might take advantage. As it was essential for the leader in such an undertaking to have the greatest confidence in success, Napoleon, in accordance with his invariable custom, did his best to encourage his admiral and tried to make the situation look as bright as possible.

But while Napoleon tried to encourage the commander, there was a sentence in the new letter of instructions which Dacres sent to accompany the new order which had the opposite effect. This sentence was very similar to the one in the first set of instructions. It ran as follows: "All the instructions you have received up till now have agreed on this point, that your stay in the Windward Islands should be marked by the capture of the English possessions." This entirely incorrect statement was later claimed by Dacres to have been a clerical error. I have purposely mentioned this point to show the bad moral effect a careless mistake in orders can have. Perhaps you have sometimes been accused of failure to obey an order which you have never received. If you have you may understand how Villeneuve felt when he first read these instructions.

These orders arrived at Rochefort too late to go with Magon, so they were sent on the frigate *Didon,* which sailed on May 3.

3. OPERATIONS IN THE WEST INDIES

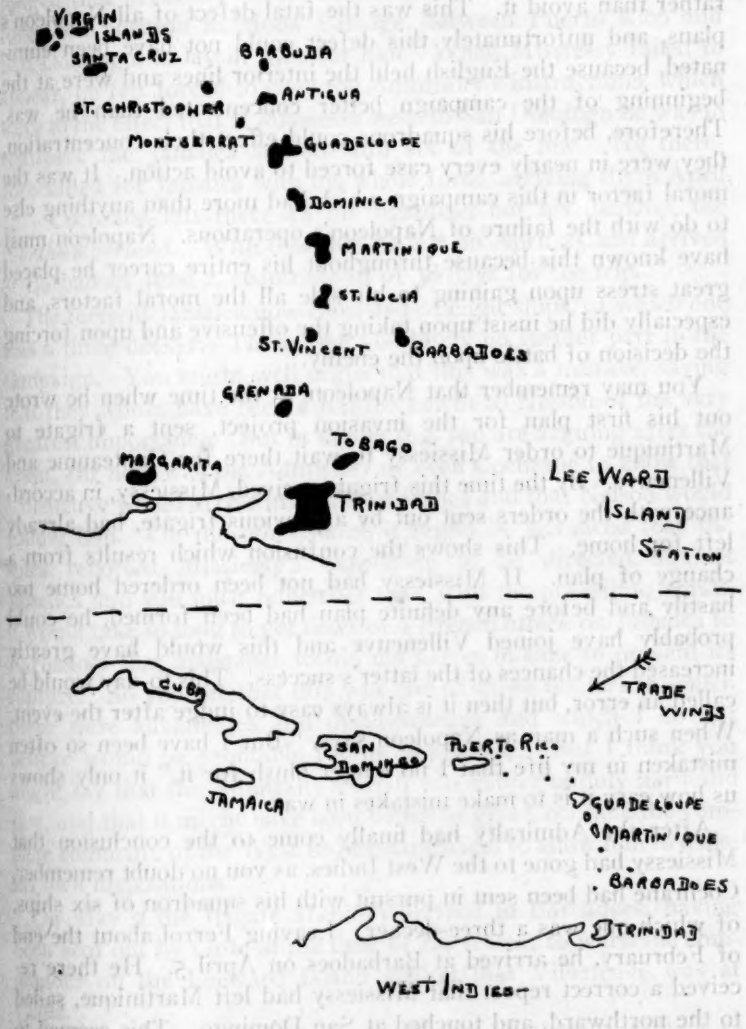
Having detailed the events in European waters, we must now see what had been happening in the West Indies. In this distant field the admirals were almost entirely out of touch with their superiors at home and the orders they were acting under could rarely be strictly carried out. It will therefore be especially interesting for us to examine the manner in which the various commanders acted under these difficult conditions.

I beg to remind you that about the middle of January the French admiral Missiessy had sailed from Rochefort with one fine three-decker of 120 guns, four two-deckers and a number of frigates. He was to operate in connection with the Toulon squadron against the English colonies and commerce in the West Indies.

On February 20, after a trip of 40 days, he arrived at Martinique. At this time there were no hostile ships of the line on the Leeward Island station, and but four old 74's at Jamaica. As the English were thus so badly outnumbered and had no warning of his coming, Missiessy was in a position to accomplish very considerable results. The day after his arrival he went to the English island of Dominica. Hoisting the English flag, he took the governor so completely by surprise that, landing troops, he was able to take practically the whole island without resistance. But the English garrison retired into a fort from which he could not dislodge them without a siege. As he was not in a position to carry on a siege, he levied a ransom on the island and went off. After some minor successes among the islands he returned to Martinique to wait for Villeneuve, who had been forced to return to Toulon.

On the southwestern coast of Martinique the English held a small island, called Diamond Rock, about a mile from the shore. A few small boats using this rock as a base had been able for the last two years to inflict great damage on the small French coasting vessels. The governor of Martinique requested Missiessy to recapture Diamond Rock, and he was just about to commence operations to this end when he received word by a frigate that Villeneuve had been forced to turn back, and orders from Napoleon to return home. He interpreted these orders so strictly that he refused to attempt anything against Diamond Rock, and immediately stood off toward San Domingo. Here he landed his troops, as his original orders required, and on March 28 sailed for France. In over a month he had accomplished practically nothing in the West Indies.

This well illustrates the futility of what Corbett calls "surprise command." To really accomplish anything it is necessary to gain absolute command of the sea, preferably by winning a decisive



battle, because a commander committed to a policy of evasion, unless he is a man of exceptional moral power, will always be expecting a hostile force to appear over the horizon, a force which

he cannot afford to fight, and this constant threat hanging over his head will so impair his resolution that he will not be able to obtain any results. To actually gain these results, he must be prepared to maintain his position against all comers—he must welcome battle rather than avoid it. This was the fatal defect of all Napoleon's plans, and unfortunately this defect could not have been eliminated, because the English held the interior lines and were at the beginning of the campaign better concentrated than he was. Therefore, before his squadrons could effect their concentration, they were in nearly every case forced to avoid action. It was the moral factor in this campaign which had more than anything else to do with the failure of Napoleon's operations. Napoleon must have known this because throughout his entire career he placed great stress upon gaining to his side all the moral factors, and especially did he insist upon taking the offensive and upon forcing the decision of battle upon the enemy.

You may remember that Napoleon, at the time when he wrote out his first plan for the invasion project, sent a frigate to Martinique to order Missiessy to wait there for Ganteaume and Villeneuve. By the time this frigate arrived, Missiessy, in accordance with the orders sent out by a previous frigate, had already left for home. This shows the confusion which results from a change of plan. If Missiessy had not been ordered home too hastily and before any definite plan had been formed, he could probably have joined Villeneuve and this would have greatly increased the chances of the latter's success. This to-day would be called an error, but then it is always easy to judge after the event. When such a man as Napoleon says, "But I have been so often mistaken in my life that I no longer blush for it," it only shows us how easy it is to make mistakes in war.

After the Admiralty had finally come to the conclusion that Missiessy had gone to the West Indies, as you no doubt remember, Cochrane had been sent in pursuit with his squadron of six ships, of which one was a three-decker. Leaving Ferrol about the end of February, he arrived at Barbadoes on April 5. He there received a correct report that Missiessy had left Martinique, sailed to the northward, and touched at San Domingo. This seemed to indicate an attack on Jamaica, where Dacres had but four units. Leaving a two-decker, the *Spartiate*, to stiffen the cruiser squadron on the Leeward Island station, he went with five ships to St.

Thomas in the Virgin Islands. Here he received information that another French concentration had been ordered for the West Indies. This must have been mere guesswork, because Villeneuve had not left the Mediterranean at this time. At any rate Cochrane judged that Missiessy would return to Martinique and he therefore took position in Mona Passage, between Puerto Rico and San Domingo, to lay in wait for him. When Missiessy failed to appear, he felt forced to obey the Admiralty's instructions, which were to the effect that if Missiessy went to San Domingo he was to reinforce the Jamaica station with six of the line. He therefore sailed for Jamaica with his whole force, arriving there April 17. Cochrane left there all his squadron but his flagship, the *Northumberland*. With this ship he left on April 25 and arrived at Barbadoes June 2, requiring all of 38 days for the trip.

The force in Jamaica now consisted of eight ships, of which one was a three-decker. These took absolutely no further part in the campaign. You might well argue that this was a mistake, saying that they would have been a reinforcement to Nelson of the very greatest importance. But in saying this you are arguing after the event, for how was the Admiralty or even Cochrane to know that Villeneuve would arrive in the West Indies and that Nelson would follow him. On the other hand, it might be advanced that the spies reported Missiessy's expedition to be directed against Jamaica and you must remember that, with the prevailing winds, it would take so long to get news of a French attack on Jamaica to Barbadoes that assistance would not arrive in time to prevent its capture. So you see that this was one of those matters in which there were advantages and disadvantages and which I do not believe would be profitable for us to criticize. But I think you might say that the Admiralty's order was rather unduly hard and fast, and that it might have been better to give Cochrane the complete command of the West Indies station and to allow him to make his own dispositions.

On May 2 the frigate *Mercury* arrived in Barbadoes, having been sent out by Orde at the time of his retreat to warn the commander on the Leeward Island station that Villeneuve was at Cadiz.

You will remember that when Villeneuve left Cadiz he had 12 French ships, all two-deckers, and two Spanish ships, *Argonaute* (80 guns) and *America* (64 guns). The four remaining Spanish

ships of the line and one frigate had left Cadiz after Villeneuve's departure and did not rejoin him en route. After passing the Canaries, Villeneuve sent two frigates out to a position about 120 miles east of Martinique in the hope that they might meet the four missing Spanish ships. On May 13 the frigates rejoined him near Martinique and reported that they had seen no Spanish ships, but had captured an English corvette of 24 guns. On the next day, May 14, Villeneuve anchored at Martinique. No sooner had he done this, than he saw to his relief three Spanish ships of the line: *Firme* (70 guns), *Terrible* (74 guns), *España* (64 guns) and the frigate *Maddalena* coming in. On the 16th the *San Raphael* (80 guns) came in. This brought Villeneuve's force up to 18 of the line, all two-deckers. On board, in addition to the crews, were about 5000 troops. Villeneuve's haste in leaving had fortunately no evil material effect; but it must certainly have had a most evil moral effect upon a fleet undertaking an exceptionally difficult enterprise.

The French authorities urged Villeneuve to undertake operations against the English possessions in the Leeward Islands. As his orders required that he remain at Martinique and that he must be ready to leave the instant Ganteaume should arrive, Villeneuve did not feel justified in modifying his orders to this extent. He therefore contented himself with sending out three frigates to operate against the English commerce and to gain information. In the meantime he used two of the line and a number of smaller ships in the attempt to recapture Diamond Rock.

On May 30, after he had been at Martinique for 16 days, the *Didon* arrived. This ship brought the latest orders of April 29 and with them Dacres' letter of instructions. These instructions contained the statement that all Villeneuve's instructions agreed that he should proceed against the English colonies without waiting for Ganteaume. This incorrect statement could not help but discourage him, and this at a time when he needed the greatest confidence and resolution.

On June 3 Diamond Rock was finally taken and the next day Magon with the *Algesiras* (74 guns) and *Achille* (74 guns) arrived, bringing the fleet up to 20 of the line. Villeneuve, in accordance with his new orders, now commenced preparations to capture Antigua and Barbuda. On the 5th he sailed to the northward, and on the 7th sighted an English convoy of 14 sail, escorted

by a schooner, near Antigua. Making chase, he took all but the schooner. From the prizes he learned that Nelson had arrived at Barbadoes.

At this point he made an interesting estimate of the situation. First, let us see what he knew of the enemy forces. He knew that Nelson's original squadron in the Mediterranean consisted of 11 ships, of which two were heavy three-deckers of 100 guns. From the prisoners he had just taken he learned that Nelson had 12 or 14 ships. Information of this kind is manifestly unreliable, but in this case it seemed to coincide closely with what was probable. He knew that Cochrane was in the West Indies with six ships, one a three-decker, and that there were four ships of the line on the Jamaica station. He concluded that it was very probable that Cochrane would join Nelson at Barbadoes. As a matter of fact, Nelson fully expected to join Cochrane with the latter's six of the line, and Cochrane did actually join him with two of the line. Thus with Nelson and Cochrane together, the enemy would have 18 or 20 ships, or 20 or 22 units, a force numerically equal or slightly superior to his own. I believe that this was a very reasonable estimation of the enemy forces. As a matter of fact, Nelson had only 12 ships, or 13 units, and for this reason Villeneuve has been accused by every historian who ever wrote upon this matter of cowardly running away from very inferior forces. But I would like to ask the historians a few questions:

1st. How could Villeneuve guess that Nelson would detach the *Royal Sovereign* of 100 guns before leaving Gibraltar?

2d. Was it not reasonable for him to suppose that the Admiralty would reinforce Nelson up to the strength of the combined fleet before he sailed? In fact, the Admiralty ordered this several times, and finally Collingwood did send two ships.

3d. How could Villeneuve guess that Cochrane would join Nelson with two units instead of seven? If he did not join with seven units, would not Nelson call these units in?

4th. Was it not at least possible that Dacres would join Nelson with the four units on the Jamaica station?

Please answer these before you make any further criticism.

After Villeneuve had thus estimated the numerical strength of the enemy forces, he had three courses of action open to him:

1st. To seek battle with Nelson.

2d. To return to Martinique and anchor in a strong position under cover of land batteries.

3d. To return at once to Europe.

Let us examine the advantages and disadvantages of these courses of action. If Villeneuve were to take the first course, to seek battle, he would gain an immense advantage by increasing the morale of the combined fleet, which was rapidly decreasing on account of his policy of evasion. In battle he could, from the information he had, count upon the enemy being practically equal to his fleet in units. He could estimate that, with numbers equal, the English force would be superior in efficiency by the ratio of at least 4 to 3, especially as it would be commanded by the great Nelson. Therefore he would have to admit that the chances of success were decidedly against him. If he were beaten, his entire force could be counted out of the campaign. If he won, his squadron would certainly be so badly handled that it would be impossible to make the necessary repairs with the poor facilities of Martinique in time for the execution of the great plan for the invasion. He would be able to hold the command of the sea in the West Indies for some months and could do the English some damage, but in time the English would certainly concentrate a superior force against him and he would be forced to retire into Martinique or to leave the West Indies with the ships which were fit for service.

Now suppose he were to try the second course of action, to retire into Martinique and wait the remainder of the assigned period. In the chase of the convoy he had gone so far to leeward that it would take him all of 10 days to regain Martinique, and during this time Nelson would probably be able to force an engagement upon him. If he gained port safely, the period of waiting would still further decrease the morale of his crews, which were rapidly decreasing in number by sickness and desertion. His provisions were running short and the island authorities could not renew his supplies. It is fairly certain that this course would have resulted in the complete loss of his squadron, and that it was far inferior as a course of action to that of seeking battle.

If he took the third course, to return immediately to Europe, he would certainly not live up to the letter of his instructions, which required that he wait a month longer. If Ganteaume were

to arrive, Villeneuve would spoil the whole campaign by leaving before the time limit. But Villeneuve probably reasoned that there was little hope that Ganteaume could escape, especially as he had failed the first time, and as the Emperor indicated by his last order that his escape was not probable. But even if he had wished to wait, his provisions would not allow him to. He had already written to Dacres that there would not be enough provisions for him to wait the month which the Emperor's order prescribed, and Gravina had already reduced the rations of the Spanish crews by one quarter. Thus you have an excellent example of the rôle logistics plays in war and of the way in which it limits strategy. You see that by reason of the small chance of Ganteaume's escape and of the part played by logistics, Villeneuve did not have to consider his order to remain in the West Indies as strictly binding. But if he took the course of returning to Europe, there was another disadvantage which he would have to consider. He had on board his ships a whole battalion of troops belonging to the Guadeloupe garrison, which must be sent back. If he went back with his whole fleet to Guadeloupe, he would have to risk an action. If he sent them back on frigates, there was great danger that they would be taken by Nelson's squadron. As against the above disadvantages a return to Europe would have the following advantages:

1st. He might by sailing immediately gain such a start that the campaign in Europe would be decided before Nelson could arrive.

2d. His sailing would be most unexpected and he might be able to fall upon the English Ferrol squadron by surprise and win a victory.

Therefore Villeneuve had to decide whether to deliberately fight Nelson or to return immediately to Europe. Before his final decision he consulted Gravina. Now you will expect me to criticize him for this. You will doubtless quote for my information the famous statement of Machiavelli, "Let only one command; several minds weaken an army." I must admit that there is no truer principle than this. However, there are exceptions to the application of all principles. This was, in my opinion, an exceptional case, as the fleet was composed of two nationalities, bound together by the weakest of ties. As the perfect cooperation of the Spaniards was so very necessary, it was well that Villeneuve should consult with Gravina so that there might be perfect accord

between the commander-in-chief and his second-in-command. Gravina very strongly urged that the fleet return to Europe, as his crews were in very bad condition.

Villeneuve therefore decided to return at once. This decision has been very strongly criticized, but if a fair and impartial examination be made, I believe that you will conclude he chose the lesser of two evils and that he made the most reasonable decision. Napoleon was certainly a harsh master to his unsuccessful admirals, but he made no criticism of Villeneuve for this decision. In fact he predicted that Villeneuve would not be able to remain in Martinique, both for the reason of his lack of provisions and on account of Nelson's arrival in the West Indies. On June 10 the Guadeloupe battalion was embarked on four frigates, which were detached with orders to land the troops at Guadeloupe and then to rejoin the combined fleet at the Azores. On the next day, June 11, the combined fleet sailed on its return voyage to Europe.

We must now see what Nelson had been doing. On June 4, after an uneventful voyage, he arrived at Barbadoes with his squadron of 10 ships of the line. Here he expected to meet Cochrane with six of the line, but while Cochrane was there he had but two of the line with him, the others being on the Jamaica station. These two ships were the *Northumberland* (80 guns) and the *Spartiate* (74 guns). This addition gave Nelson a total force of 13 units. He believed the enemy to have 18. These were big odds, but were they as big as they might seem? In addition to the usual ship for ship superiority of the English over the French, there were several points in his favor:

1st. The English ships and crews were the best in the service, as they had been at sea for a long period under the same leader and were accordingly perfectly familiar with his tactical principles.

2d. The English squadron had been acting on the offensive and pursuing the enemy for two months, which would naturally greatly increase their morale.

3d. Their commander was easily the greatest admiral of the day, his value on the battlefield being estimated by Mahan as equivalent to a reinforcement of three ships of the line.

4th. The hostile squadron was composed of ships of two nationalities. This has in practically every case proved a great disadvantage.

5th. Six of the enemy ships were Spanish. You may estimate the opinion of Spanish ships which the English held by remembering that at the Battle of St. Vincent, Jervis with 15 ships attacked 27 Spaniards.

Thus you must admit that Nelson should have counted on having at least equal chances of success in battle. In fact, he was certain that if he met the combined fleet he could repeat his performance at the Battle of the Nile.

But aside from the actual chances of success, it was certainly very advisable from the strategic point of view to force battle upon the combined fleet, because, whatever the result of the action, the French combination was certain to be broken up, as I have tried to show above when looking at the French side of the matter. Nelson had thus everything to win by a battle and nothing to lose. Nelson, above all others, knew when a tactical loss would be a strategic gain. Therefore he lost no time in deciding for instant action.

This decision made, his next task was to locate the combined fleet. Nelson believed that it had gone to the northward, but the commander of the English garrison on St. Lucia reported to him at Barbadoes that the combined fleet had been sighted on the night of May 28 passing to the southward. Believing that the enemy had already landed on Trinidad, Nelson embarked 2000 troops of the Barbadoes garrison, and on June 5 sailed in that direction. On the 7th, Nelson arrived at Trinidad and found nothing there. On the 8th, he sailed to the northward, receiving word on the way that Diamond Rock had been taken and that the combined fleet was still at Martinique. On the 9th, he received word that three days before the combined fleet had been sighted off the southern end of Guadeloupe, steering north. Nelson hurried on with all possible speed.

On June 12 Nelson, then at Antigua, received word that the French troops, which had been sent back on the four frigates, had been disembarked at Guadeloupe. He then decided that Villeneuve had returned to Europe. The brig *Curieux* was sent to the Admiralty with dispatches to that effect. As soon as the 2000 troops on his ships could be disembarked, Nelson got under way for the return to Europe. About an hour afterward a schooner went alongside the *Victory*. This was the vessel which had been escorting the convoy which Villeneuve had captured on the 7th.

The captain had been carrying dispatches to the Admiralty, but had considered it very important to carry his important information to Nelson. In this puzzling situation, he had opened his dispatches, and, finding nothing of importance in them, had gone to find Nelson. He was able to give the latter complete information of the composition of the combined fleet.

Thus on June 13, Nelson set out in pursuit of Villenueve. He was only two days behind. He took with him the *Spartiate* (74 guns), but left Cochrane with the *Northumberland* on the Leeward Island station.

While Nelson was certain that Villeneuve had gone back to Europe, Cochrane believed for some time that he had gone to Jamaica. It was not until July 13 that he received information that the combined fleet had been seen heading on a course toward Ferrol. At the same time the two ships, *Illustrious* and *Ramillies*, which Collingwood had sent to the West Indies, arrived. Cochrane immediately sent them back to England with two convoys. This ended the operations in the West Indies.

I would like to call attention at this point to the cordial and generous cooperation which existed among the English admirals. You have seen how Bickerton, Nelson's second-in-command, made no complaint when he was left in the Mediterranean without a single ship of the line. Nelson had given Knight one of his two three-deckers. Collingwood, who was to have the command of a fine squadron of 16 ships, had allowed Gardner to detach five before he had sailed. He had allowed Bickerton with three ships to join Calder; he had sent two ships to Nelson, and when Bickerton returned had given him four ships to blockade Carthagena. Out of 16 ships, he had but four left under his own command. Cochrane had given four ships to Dacres at Jamaica, and a fifth to Nelson, retaining but one ship for himself. Then when two more ships arrived, he had sent them back with the first convoys. The only jarring note in the entire campaign had been Nelson's bitterness toward Orde and his harsh criticisms of that officer's conduct. I wish to emphasize to you the great importance in strategy of this cordial cooperation and cheerful self-sacrifice.

It was not until June 17 that Nelson recognized the possibility of the combined fleet's going to Ferrol. On the 19th, he received word from an American merchant ship which convinced him that its real destination was Cadiz or Toulon. Still he had to consider

both cases. If Villeneuve were to go to Ferrol, Nelson believed that the Admiralty could concentrate sufficient ships there to beat him. On the other hand, if he went into the Mediterranean, Nelson believed that he would have everything his own way, and Nelson was still afraid of an expedition to Egypt. Nelson therefore concluded that Villeneuve would most probably go to the Mediterranean and that he could do the most damage there. For these reasons he decided to go to Gibraltar. You see that Nelson was entirely ignorant of the enemy's plan of campaign, and was forced to guess between two possible destinations. The fact that his guess was so entirely wrong is further evidence of the great advantage of the initiative in naval warfare. The situation was certainly developing very favorably for the French and the chances looked bright for the accomplishment of the Emperor's plan.

As a matter of precaution Nelson sent a frigate to warn Calder off Ferrol. The frigate was to rejoin him off St. Vincent with all the latest information. On July 19 Nelson anchored at Gibraltar. The officials there were able to give him no news whatever of the combined fleet.

[TO BE CONTINUED]

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THE SEARCH FOR INSTRUMENTAL MEANS TO ENABLE NAVIGATORS TO OBSERVE THE ALTITUDE OF A CELESTIAL BODY WHEN THE HORIZON IS NOT VISIBLE

By G. W. LITTLEHALES

The necessity of seeing the horizon, in order to find the latitude and longitude of a ship at sea, has generally precluded the taking of observations of altitude at night when the number of celestial bodies shining in the firmament is the greatest and would present the most numerous opportunities for determining geographical position if the altitude could be measured without the help of the sea horizon. And even during the daytime navigators are often sensible of this inconvenience on account of the obscuration of the horizon by haze or fog while the luminary continues to be visible in the sky.

In 1733, two years after he had invented the reflecting sextant now in universal use among navigators for taking astronomical observations at sea, John Hadley brought into notice the instrument, illustrated in Fig. 1 for supplying the deficiency of his sextant when the horizon is not visible, by mounting a sensitive spirit-level on a graduated quadrant fitted with a telescope, in such a manner that, when the level is nearly horizontal, the observer focuses the telescope on the celestial body and at the same time closes a stop-cock in the level-vial. Then the reading of the level-scale furnishes a correction to be added to or subtracted from the reading of the quadrant according to which side of the zero of the level-scale the center of the liquid column is displayed. In the *Philosophical Transactions* of the Royal Society (London), No. 430, for the months of November and December, 1733, Hadley describes the manner of observing with this instrument as follows:

> Holding the quadrant in a vertical position, with that limb to which the level is fixed parallel to the horizon, raise the index to some division of

the arc, as near as you can to the true altitude of the object; which is supposed to be near the meridian, and consequently to alter its altitude but slowly; then turning the key of the stop-cock so as to let the spirit of wine pass through the small hole in it, keep the image of the object as

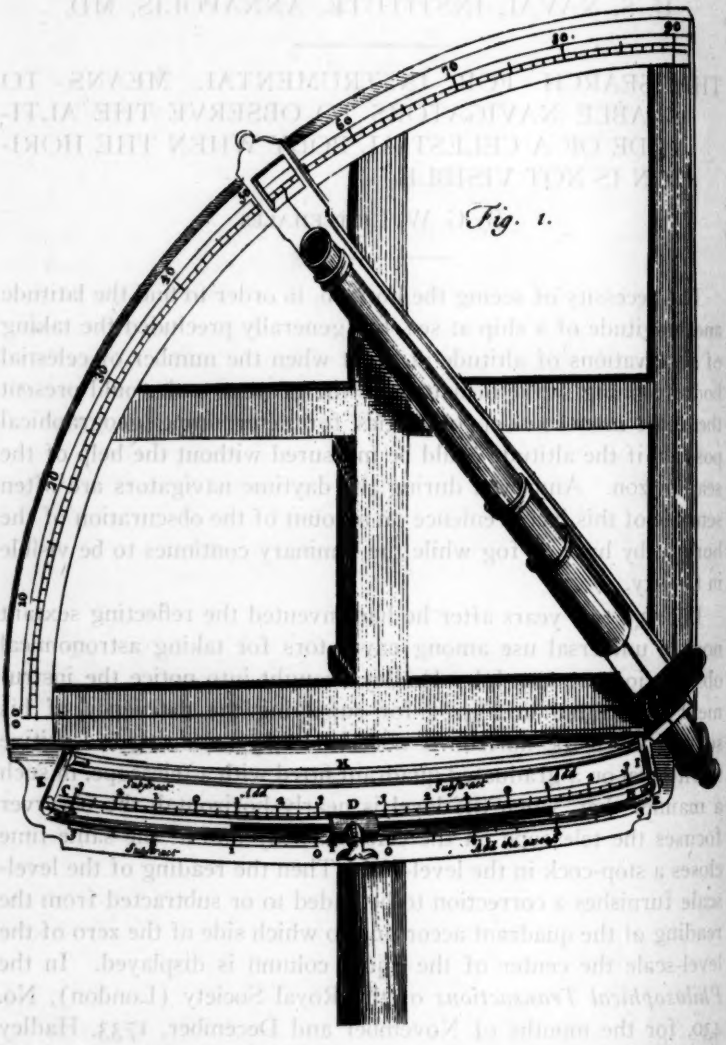

Fig. 1.

close to the thread on the vane as you can, endeavoring that the unavoidable vibrations of it above and below the thread, may be equal, both in respect of their length and the swiftness of their motions. Continue this until the spirit seems quite settled to some part of the scale, and some-

thing longer. This it will do slowly, but without any sensible vibrations; for the stop-cock allowing it no passage through the small hole in its key, will give such a check to its motions, as not only to stop those vibrations, but also to hinder its being thrown backwards and forwards in the tube by any shocks of the instrument; and yet, as far as I have observed, will not prevent its settling (with sufficient truth, though slowly) to the lowest part of the tube. About half a minute of time or more may be necessary for this, according as the aforesaid small hole is greater or less in proportion to the bore of the tube. When you judge the spirit quite settled, turn the stop-cock again: it is of no importance that the image of the object be exactly on the thread at the instant that this is done. Observe against what degree, and part of a degree, each end of the spirit in the tube stands. If your scale be numbered like the upper one in the figure, and the quantity of spirit be exact, both ends will agree, and the degree and parts marked must be added to, or subtracted from the altitude shown by the index, according to the directions. If the ends do not exactly agree, take the mean between them. If you use the under scale, subtract the less number from the greater and add or subtract the excess, the number resulting will show the mean elevation of the index during the latter part of the observation, and will differ from the true altitude of the object about half so much as the vibrations of its image above and below the aforementioned thread on the vane fail of compensating one another during that time. If either end of the spirit leave the scale, the index must be removed three or four degrees, and the observation repeated.

Instead of the curved tubes *A* and *B*, two straight ones might be used, set together so as to make a very obtuse angle in the middle; but then it will be convenient to have the quantity of spirit more exactly fitted to the scale, because the allowing for the difference will be something more troublesome.

If the observer has an assistant to attend to the level, while he himself observes the object, the whole apparatus of the brass tube and stop-cock may be omitted, substituting in its room only a plug with a small hole in it, which may be wrapped round with a very thin slice of cork, and so thrust down into the middle of the glass tube. The cutting of the glass tube in half in the middle may likewise be avoided, if, instead of the stop-cock at *G*, there be one fixed in one or both of the pipes *I* and *K*, to open and stop the passage of the air, having a larger hole in their keys, there being also a plug with a small hole thrust down into the middle of the tube, as before.

The bore of the small pipes *I* and *K*, and the tube *H*, must not be so narrow as to make it difficult to reduce the spirit into its place, if by any accident either end of it should get into them.

I have been informed that an object may be kept in view without much difficulty, even in pretty rough weather, through a telescope magnifying about ten times. Now as such telescopes seldom comprehend an area of much more than one degree in diameter, or at most 1 degree and 20 minutes, it follows that the axis of the telescope is always kept within 40 minutes at the most of the object, and that is the greatest vibration of

the image above and below the thread on the vane. If this be allowed, it seems reasonable to expect that the mean of the vibrations one way should not exceed the mean of those at the other more than by about ⅕, or ⅙ part of the greatest vibrations; *i. e.*, about 7 or 8 minutes, the half of which will be the error of observation. In still weather it will probably be much less, if the instrument be in the hands of a person moderately skilful in observing.

The modern form of this zenith-distance quadrant or clinometer possesses the advantage of bringing the images of the observed body and a level-bubble into coincidence in the field of view. The manner in which this result is effected is illustrated in Fig. 2, in which the telescope tube mounted on one of the bounding radii of

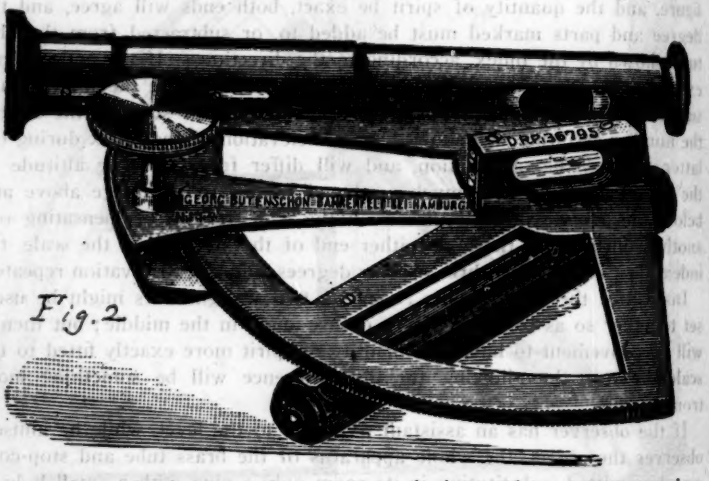

Fig. 2

the quadrant is shown to be cut away in its under part to receive, upon a perforated mirror placed in the tube, the image of the level-bubble in the level-vial attached to the index-arm. The angle of inclination of the mirror is such that when the level-bubble is in mid-position in its vial it will be visible in the eye-piece of the telescope in an upright position, while through the perforation in the mirror the cross-hairs of telescope and the image of the observed object may be seen. It is advisable first to point the telescope toward the object to be observed, bringing its image into the middle of the square formed by the perpendicular pairs of parallel cross-hairs, and then to move the index-arm until the level-bubble appears in the field of view with its limits extending to equal distances beyond the upper and lower cross-hairs. The accuracy of the observation is found to be improved when the

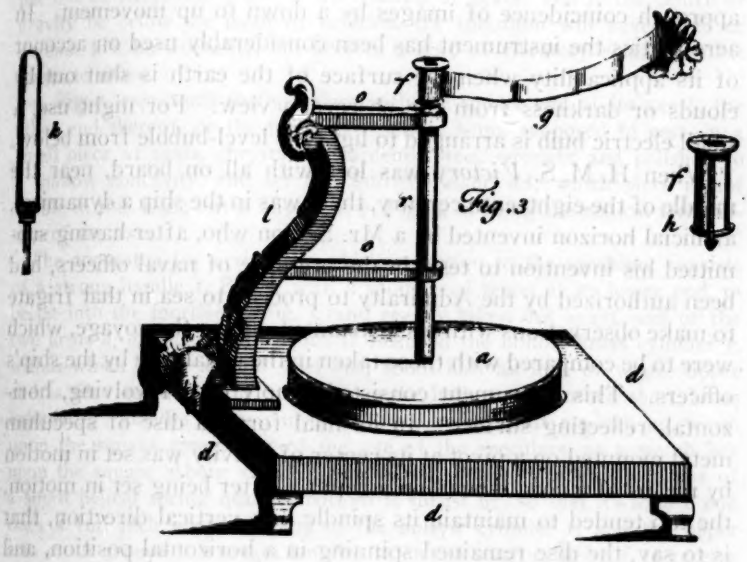

Fig. 3

Fig. 4

Fig. 5

level-bubble is allowed to run from up to down and then to approach coincidence of images by a down to up movement. In aeronautics the instrument has been considerably used on account of its applicability when the surface of the earth is shut out by clouds or darkness from the observer's view. For night use, a small electric bulb is arranged to light the level-bubble from below.

When H. M. S. *Victory* was lost with all on board, near the middle of the eighteenth century, there was in the ship a dynamical, artificial horizon invented by a Mr. Serson who, after having submitted his invention to tests in the presence of naval officers, had been authorized by the Admiralty to proceed to sea in that frigate to make observations with his instrument during the voyage, which were to be compared with those taken in the usual way by the ship's officers. This instrument consisted simply of a revolving, horizontal, reflecting surface. In its final form, a disc of speculum metal mounted on a pivot at its center of gravity was set in motion by means of a cord wound on a drum. After being set in motion, the top tended to maintain its spindle in a vertical direction, that is to say, the disc remained spinning in a horizontal position, and all objects at rest and reflected by its surface to an observer also at rest appeared entirely without motion. Then, by means of Hadley's reflecting sextant, the angle between the celestial body to be observed and its reflected image in the revolving speculum could be measured and would indicate twice the apparent altitude. The following description, in which reference is made to Figs. 3, 4 and 5, is from the *Gentlemen's Magazine* (London), 1754:

THE "SPECULUM" DESCRIBED

It is made of the metal used for reflecting telescopes; something more than three inches diameter, but no thicker than is necessary for grinding and polishing it to an exquisitely true plane, that being essential to its just performance; as also is the perpendicularity of its axe, which must be of hardened steel, whose lower end, which extends but a small matter beneath the speculum's lower surface, terminates in a cone whose point is a little rounded off. Its other end, which rises half an inch above the polished surface, is filed square. The speculum is let into the upper edge of a brass hoop, half an inch deep, and thick enough to bear being turned away thinner and thinner, in a lathe, till the conical point of the axe, or the point of rotation, be found to be precisely in the common centre of gravity of the speculum, hoop, and axe, taken all together; this being the main intention of the hoop. For if the centre of gravity be higher than the point of rotation, the top will not spin so long, and will be more easily

put out of its position, tho' it will recover it again; and if the centre of gravity be below the point of rotation, the speculum will never recover its once lost horizontality, but keep in a kind of vibratory rotation, till it ceases to move.

a, Fig. 5, represents the speculum with the square end of its axe *b*, the other end thereof, or the point of rotation, being supposed to rest on a small piece of agate, chrystal or hardened steel, wrought and polished to a shallow concavity, and set fast into the stand *dd;* which piece is not visible in this Fig.; but is shown at *p*, Fig. 4, *m* being the conical termination of the axe.

The apparatus for giving the whirling motion to the speculum consists of a strong handle 1, Fig. 3, with a shouldered tenon at its lower end, to be let into the mortise *e*, Fig. 5, and readily taken out again, and of the two arms *o*, *o*, Fig. 3, into which is fastened the hollow brass cylinder *r*, within which slides a solid steel one, about half an inch of whose upper end is filed square, to fit into the square hollow of another short brass cylinder, *f;* and its lower end is hollowed square half an inch up, to go upon the square upper part of the axe of the speculum, as a watch key upon the square arbour of the fusee. This sliding cylinder, by means of a small helical spring near its bottom is thrust up, so that its square end rises a full inch above the top of the hollow cylinder *r*, and the upper arm *o*. A groove is wrought lengthwise on the small cylinder *f*, to receive a little spring fastened by its upper end, but loose at the other, with a small catch *h* at its extremity.

When the speculum is to be set a going, the conical end of its axe is placed in the centre or middle of the polished concave, and the handle *l* fixed on. Then must the cylinder *f* be put on upon the square broach *k*, and about 3 quarters of a yard of strong ribband must be coiled round the said cylinder pretty tight, by turning round the handle of the broach, whereby all but the catch end of the spring will be buried in its groove. The ribband being secured on, by sticking a little pin in it, the small cylinder must be taken from the broach, and thrust on upon the square end of the solid cylinder, and both together pressed strongly downwards by the thumb on top, till the hollow square of the solid cylinder embraces the axe of the speculum, and the little catch lays hold of the top of the hollow cylinder, and keeps all confin'd. Lastly, the pin being taken out of the ribband, it must be enrolled a turn or two, and laid fast hold of by the operator's right hand; and the bottom of the handle, *l*, together with the stand *d*, grasped and firmly held down with his left; when giving a smart and continued tug, he whirls the top violently round and wholly uncoils and disengages the ribbands; at which instant the catch flies back, and suffers the helical spring to push up the sliding solid-cylinder, and so leaves the top to spin at freedom.

THE MANNER OF OBSERVING WITH THE "SPECULUM" AT SEA

The handle *l* being remov'd, and the top spinning briskly must, in case it blows hard, be defended by a covering, two of whose sides are glass planes well polish'd, perfectly parallel and joined together at right

angles, like the ridge of a house; but if it be calm, such covering will be better omitted. The observer places himself so as to see the image of the sun in the speculum; then looking through the sight of his quadrant, he moves the index till the image of the sun, reflected by the speculum of the quadrant, is perfectly united with this image reflected by the whirling speculum; and then, as has been said before, the index *Q*, Fig. 5, shows on the limb, an angle equal to the angle *Sas*, which is the double of the sun's apparent altitude above the true horizon.

After Serson perished, it is not known that further investigations were made in the direction which he had proposed until the latter part of the nineteenth century when Admiral Fleuriais designed a gyroscopic horizon as an attachment to the frame of the

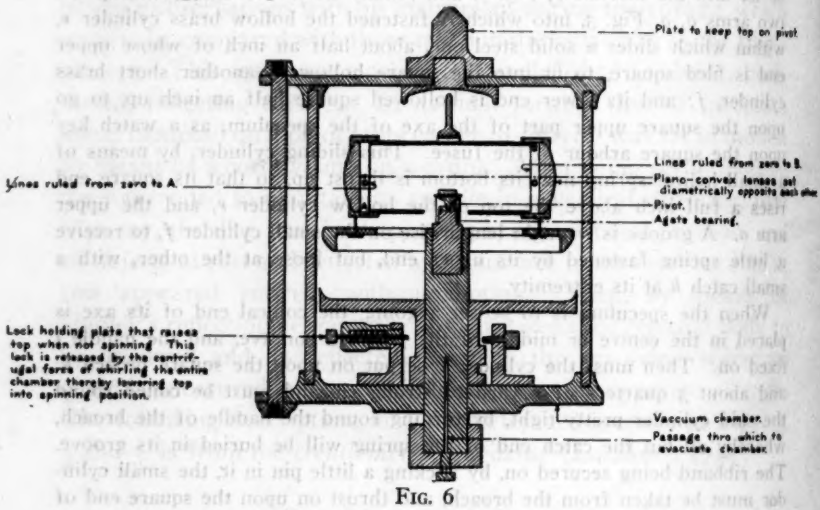
Plate to keep top on pivot
Lines ruled from zero to A
Lines ruled from zero to B
Plano-convex lenses set diametrically opposite each other
Pivot.
Agate bearing.
Lock holding plate that raises top when not spinning. This lock is released by the centrifugal force of whirling the entire chamber thereby lowering top into spinning position.
Vacuum chamber.
Passage thro which to evacuate chamber.

FIG. 6

sextant of reflection. As with Serson's horizon, the basic principle is the tendency of a top suspended at its center of gravity to maintain its axis of rotation in a vertical position, but the mechanical details and methods of observation are quite different. Fleuriais reduced the size of the rotating part to about 10 centimeters in diameter, and, in order to eliminate the effects of air resistance, he provided for spinning the horizon in a vacuum. Figs. 6 and 7 will serve to show the arrangement of parts. The Fleuriais method of observing the altitude and eliminating the effects of the precession of the top are ingenious and unique. On opposite ends of a diameter of the rotating disc are mounted two plano-convex lenses with the convex side facing away from the center. These two

lenses have equal focal distances; and they are mounted so that their plane faces are at one focal length away from each other. On one lens, lines are ruled from the middle to the top, about 10 minutes apart and parallel to the surface of the disc; and on the opposite lens similar lines are ruled, but from the middle to the bottom. When the top is set in rapid motion, the retina of the eye perceives these lines as a grating with 21 lines; the center line being numbered zero. Now as the top precesses, the image of the celestial body as seen in the telescope appears to oscillate between positions on the grating. These positions can be read directly; and the zero point calculated. The angle at which the top spins is then known and the necessary correction made to the reading on

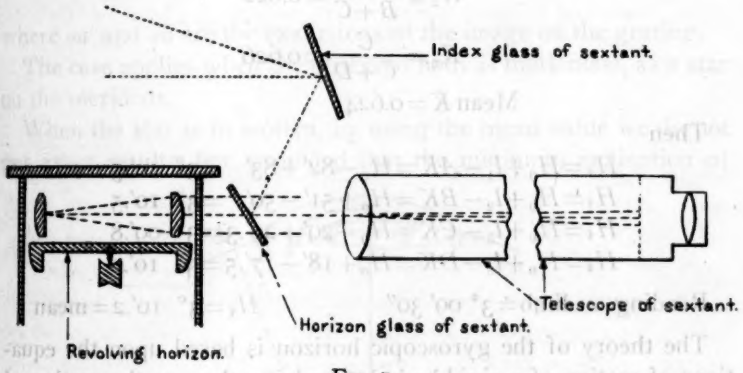

FIG. 7

the limb of the sextant. An example of the use of the grating is given herewith. Such observations must take into account the only case of practical importance; namely, that of a pivot that is rounded. In this case the spindle will describe an equiangular spiral, and, therefore, the readings on one side of the zero line will not equal those on the opposite side.

Example.—Observation of the altitude of the moon:

Let H_i = instrumental altitude.
H_0 = the reading of the limb of the sextant.
$l(x)$ = reading on the grating.
$l_1, l_2, l_3 \ldots$ .etc. = limits of excursions of the image of the moon on the grating.

$$H_i = H_0 + l(x)$$
$$l(x) = l_1 \pm AK$$

Then

$$H_i = H_0 + l_1 \pm AK$$

$l_1 = -82'$

$l_2 = +51'$ $\quad A = 133'$

$l_3 = -29'$ $\quad B = 80'$

$l_4 = +18'$ $\quad C = 47'$

$l_5 = -10'$ $\quad D = 28'$

Then

$$K_1 = \frac{A}{A+B} = 0.624$$

$$K_2 = \frac{B}{B+C} = 0.622$$

$$K_3 = \frac{C}{C+D} = 0.626$$

$$\text{Mean } K = 0.624$$

Then

$H_i = H_0 + l_1 - AK = H_0 - 82' + 83' = 3^\circ\ 10'.5$

$H_i = H_0 + l_2 - BK = H_0 + 51' - 50' = 3^\circ\ 10'.5$

$H_i = H_0 + l_3 - CK = H_0 - 29' + 29'.3 = 3^\circ\ 09'.8$

$H_i = H_0 + l_3 - DK = H_0 + 18' - 17'.5 = 3^\circ\ 10'.0$

Reading on limb $= 3^\circ\ 09'\ 30''$ $\qquad H_i = 3^\circ\ 10'.2 = \text{mean}$

The theory of the gyroscopic horizon is based upon the equations of motion of a rigid body by applying them to the motion of a rotating body suspended at its center of gravity. The equations reduce down to the following:

$$\Phi = \frac{gd}{R^2\omega} \text{ where } \begin{cases} g = \text{gravity.} \\ R = \text{radius of gyration.} \\ d = \text{diameter.} \\ \Phi = \text{speed of precession.} \\ \omega = \text{angular velocity of rotation.} \end{cases}$$

$$\text{also } \Phi = \frac{2\pi}{2T} = \frac{gd}{R^2 \times 2\pi N} \text{ where } \begin{cases} T = \text{time of one-half revolution of precession.} \\ N = \text{number of revolutions of the top in one second.} \end{cases}$$

$$\text{and } T = \frac{2\pi^2 R^2 N}{gd}$$

or, since π^2 is approximately equal numerically to g in C. G. S. units,

$$T = \frac{2R^2N}{d}.$$

Therefore, the time of one-half revolution of precession is independent of the mass of the top and of the inclination to the vertical of the axis of the top.

The theory must take into consideration two main cases: Firstly, where the top is spinning on a stationary point, and secondly, where the effects of the rotation of the earth must be taken into account. Again, under each of these heads, the nature of the pivot must be considered, and the velocity of the observed body must be taken into account.

When the support is motionless and the top is spinning on a sharp pivot, the altitude is given by

$$H_i = H_0 + \frac{oa' - oa}{2}$$

where oa' and oa are the excursions of the image on the grating.

The case applies when the observed body is motionless, as a star on the meridian.

When the star is in motion, by using the mean value we do not get exact results, but, provided that the minimum inclination of

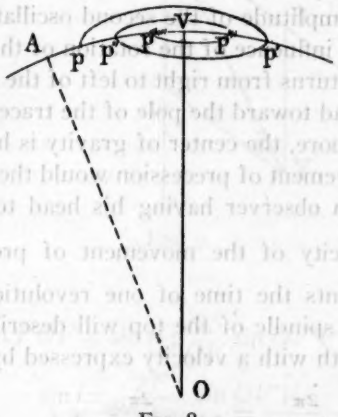

FIG. 8.

the axis of the top is 1°, the results will be close enough for practical purposes. This conclusion can be deduced from the equations given above.

In the case of a rounded pivot, the spindle describes an equiangular spiral instead of a circle, as in the case of the sharp pivot. Then, referring to the diagram,

$$K = \frac{Vp}{pp'} = \frac{Vp'}{p'p''} = \frac{Vp''}{p''p'''}, \ldots, \text{etc.}$$

When the path was a circle, we had $AV=\frac{Ap+Ap'}{2}$; but now we must have

$$AV=Ap+Vp=Ap+pp'\times K$$

in which $K=0.5+E$, where E is proportional to $c\times\frac{r}{d}$,
where c = a constant depending on the surface,
r = radius of point, and
d = distance from point to center of gravity.

Then,

$$AV=Ap'-Vp'=Ap'-pp''\times K$$
$$AV=Ap''-Vp''=Ap''+pp'''\times K.$$

To determine K, three summits are sufficient, consequently

$$Ap'-Ap=(pp'+p'p'')K$$

$$K=\frac{pp'}{pp'+p'p''} \text{ or } K=\frac{A}{A+B}$$

where $A=pp'$ = amplitude of the first oscillation.
$B=p'p''$ = amplitude of the second oscillation.

In regard to the influence of the rotation of the earth, the gyroscope in a vacuum turns from right to left of the observer when he stands with his head toward the pole of the trace of the spindle of the top. Furthermore, the center of gravity is below the point of support. The movement of precession would then take place from left to right of an observer having his head toward the zenith. The angular velocity of the movement of precession $=\frac{2\pi}{2T}$, in which $2T$ represents the time of one revolution of precession. Consequently, the spindle of the top will describe a cone around the axis of the earth with a velocity expressed by

$$\frac{2\pi}{24 \text{ hours}}=\frac{2\pi}{86{,}400 \text{ seconds}}.$$

This motion around the axis of the earth combined with the precession of the top will give a certain absolute motion of the spindle, which may be illustrated by the accompanying diagram. The first precession is caused by gravity and may be drawn by OV. The second precession is caused by rotation of the earth and takes place in the direction of the axis of the earth. These two forces are proportional to the velocities of the corresponding precessions.

Let the first force be represented by OV and the second in the direction of the axis of the earth by OS, then the resultant will be OV'. The numerical values of the forces will be

$$OV=\frac{2\pi}{2T} \text{ and } OS=\frac{2\pi}{86{,}400}.$$

The precession of the top will actually take place around OV'.

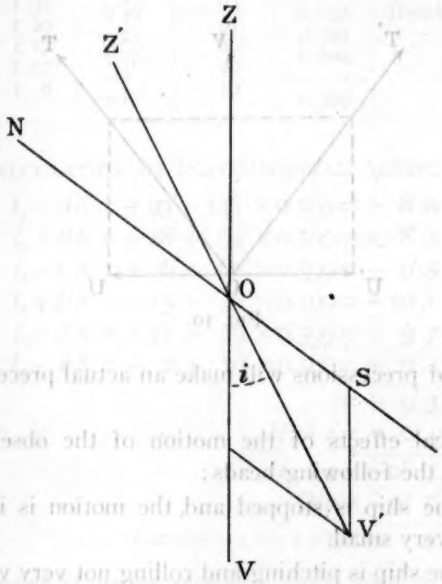

FIG. 9.

Then

$$\sin VOV'=\sin i=\frac{OS}{OV}\sin OV'V$$

where

$$\sin i=\frac{2T}{86{,}400}\sin OV'V$$

expressing i in minutes of arc,

$$i=\frac{2T}{86{,}400}\sin l'\cos L$$

or

$$i=\frac{2T}{25}\cos L.$$

This correction must be applied according to the way the top turns. If it turns from left to right, the observed altitude facing

northward, will be smaller; and, if to the southward, the observed altitude will be larger. This correction will also be greatest when the observation is made on the meridian and on the equator.

The motions of the observer also have effects upon the top, which in turn will affect the reading as taken on the grating.

If the top precesses around OV and if the axis is accelerated along OU there will be a precession around OU as an axis. This

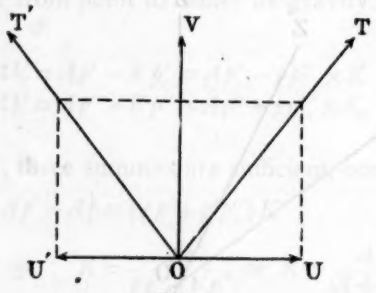

FIG. 10.

combination of precessions will make an actual precession around OT.

The practical effects of the motion of the observer may be classed under the following heads:

1. When the ship is stopped and the motion is irregular, the error will be very small.

2. When the ship is pitching and rolling not very violently, then the greatest error will be 3′.

3. In the condition of most violent pitching and rolling, the error will be between 5′ and 6′, but this condition is seldom met with.

The corrections to apply to the observed altitude may then be expressed by the following formula:

$$Ha = Hi + e + i + c$$

in which

Ha = apparent altitude.
Hi = instrumental altitude.
e = correction for instrumental error.
i = correction for rotation of earth.
c = correction for error affecting all measured height.

A DETERMINATION OF K AND C BY OBSERVATIONS OF THE SEA HORIZON

Time of observation of summit	Time of ½ revolution of precession	Reading of grating	Amplitudes A B C	K	Reading of vernier of sextant
h m s	m s				
8 16 20		+93′		0.600	H_0=−0′ 17″
18 16	1 56	−48′	141′	0.606	Error inst.=−2′
19 53	1 37	+46′	94′	0.592	Height of eye=8m.
21 22	1 29	−15′	61′	0.591	
22 39	1 17	+27′	42′	0.604	
23 56	1 17	−2′	29′		
25 4	1 8	+17′	19′	0.599	

CALCULATION OF INSTRUMENTAL ALTITUDE

$$l_1 - AK = +93' - 141' \times 0.599 = +\ 8'.6$$
$$l_2 + BK = -48' + 94' \times 0.599 = +\ 8'.3$$
$$l_3 - CK = +46' - 61' \times 0.599 = +\ 9'.5$$
$$l_4 + DK = -15' + 42' \times 0.599 = +10'.1$$
$$l_5 - EK = +27' - 29' \times 0.599 = +\ 9'.7$$
$$l_6 - FK = -\ 2' + 19' \times 0.599 = +\ 9'.4$$
$$= +\ 9'.3$$
$$H_0 + e = -\ 0'.19$$
$$H_i + e = -0°\ 9'.7$$
$$Dip = -0°\ 5'.1$$
$$C = dip - (H_i + e) = +\ 4'.6$$

In the *Annales Hydrographiques,* Paris, 1901, Captain Guyou has provided tables and diagrams which facilitate the reduction of observations made by the gyroscope-sextant; and an improved instrument, illustrated in Figs. 11, 12 and 13, was produced in 1904 by Ponthus and Therrode, in which the gyroscopic horizon is rotated on its axis by a current of air blown against the vanes on its periphery, and the grating, illuminated by an electric lamp, is formed by transparent lines ruled on a black surface with a lens placed opposite. A systematic and scientific examination of this instrument has been made, of which an account is given by M. Favé, hydrographic engineer-in-chief, French Navy, in the *Annales Hydrographiques* for 1904. After many trials, it has been shown that the greatest liability to error in a perfectly new instrument of this type is 2′, although after much usage larger errors are found to creep in.

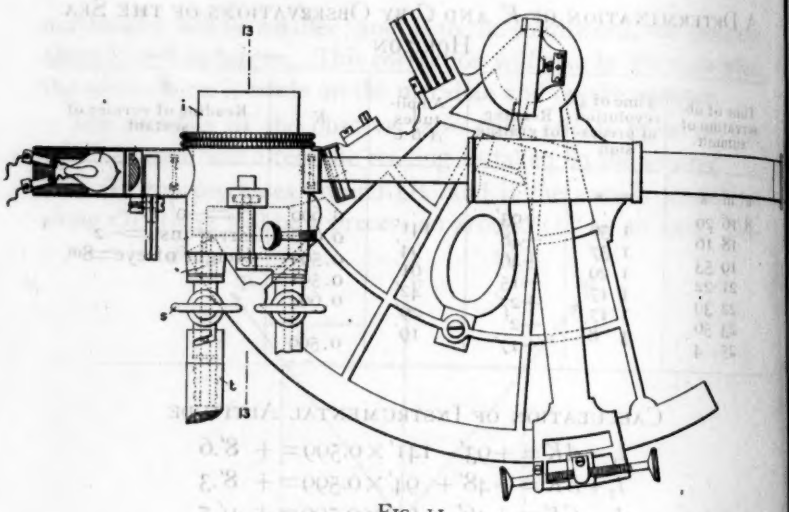

FIG. 11.

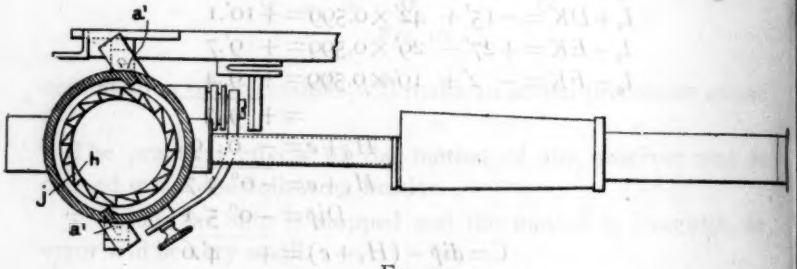

FIG. 12.

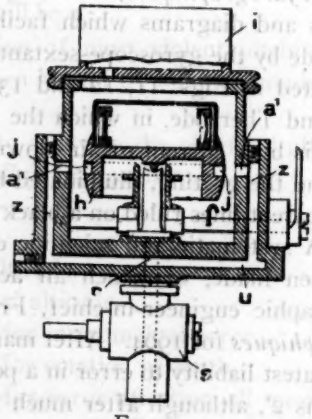

FIG. 13.

There may, of course, be other methods of approach toward the evolution of a gyroscopic horizon besides those of Serson and of Fleuriais; but in relation to these two—one employing a rotating speculum tending to maintain a horizontal reflecting surface in which the angle between the observed celestial body and its reflected image could be obtained, and the other employing a small top whose angle of precession could be measured for the purpose of correcting the instrumental reading of the altitude—practically nothing has been done to improve the former which appears to be free of limitations which have marked the development of the latter. It is a matter of great difficulty to read directly to minutes on a scale of small diameter, as of a top on a sextant, whatever combination of lenses might be used; and any method by which such a top can be set in motion in a vacuum precludes that control of its speed by the operator by which alone he may obtain the most stable position under varying circumstances.

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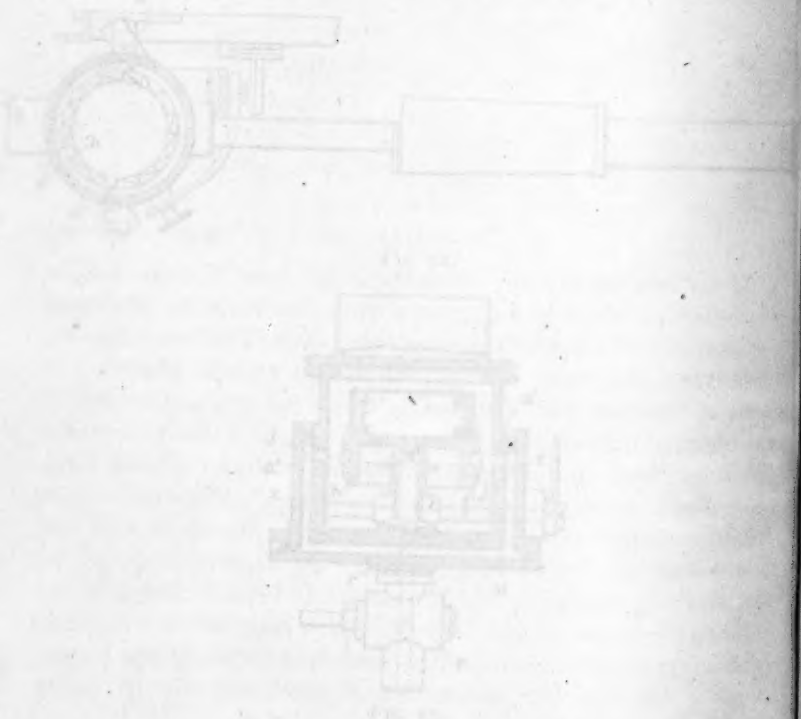

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

LEADERSHIP[1]

By MAJOR C. A. BACH, U. S. A.

In a short time each of you men will control the lives of a certain number of other men. You will have in your charge loyal but untrained citizens, who look to you for instruction and guidance.

Your word will be their law. Your most casual remark will be remembered. Your mannerism will be aped. Your clothing, your carriage, your vocabulary, your manner of command will be imitated.

When you join your organization you will find there a willing body of men who ask from you nothing more than the qualities that will command their respect, their loyalty and their obedience. They are perfectly ready and eager to follow you so long as you can convince them that you have those qualities. When the time comes that they are satisfied you do not possess them you might as well kiss yourself good-by. Your usefulness in that organization is at an end.

From the standpoint of society, the world may be divided into leaders and followers. The professions have their leaders, the financial world has its leaders. We have religious leaders, and political leaders, and society leaders. In all this leadership it is difficult, if not impossible, to separate from the element of pure leadership that selfish element of personal gain or advantage to the individual, without which such leadership would lose its value.

It is in the military service only, where men freely sacrifice their lives for a faith, where men are willing to suffer and die for the right or the prevention of a great wrong, that we can hope to realize leadership in its most exalted and disinterested sense. Therefore, when I say leadership, I mean *military leadership*.

In a few days the great mass of you men will receive commissions as officers. These commissions will not make you leaders;

[1] An address delivered to the graduating officers at Fort Sheridan.

they will merely make you officers. They will place you in a position where you can become leaders if you possess the proper attributes. But you must make good—not so much with the men over you as with the men under you.

Men must and will follow into battle officers who are not leaders, but the driving power behind these men is not enthusiasm but discipline. They go with doubt and trembling, and with an awful fear tugging at their heartstrings that prompts the unspoken question, "What will he do next?"

Such men obey the letter of their orders but no more. Of devotion to their commander, of exalted enthusiasm which scorns personal risk, of *their* self-sacrifice to insure *his* personal safety, they know nothing. Their legs carry them forward because their brain and their training tell them they must go. Their spirit does not go with them.

Great results are not achieved by cold, passive, unresponsive soldiers. They don't go very far and they stop as soon as they can. Leadership not only demands but receives the willing, unhesitating, unfaltering obedience and loyalty of other men; and a devotion that will cause them, when the time comes, to follow their uncrowned king to hell and back again if necessary.

You will ask yourselves: "Of just what, then, does leadership consist? What must I do to become a leader? What are the attributes of leadership, and how can I cultivate them?"

Leadership is a composite of a number of qualities. Among the most important I would list self-confidence, moral ascendency, self-sacrifice, paternalism, fairness, initiative, decision, dignity, courage.

Let me discuss these with you in detail.

Self-confidence results, first, from exact knowledge; second, the ability to impart that knowledge; and, third, the feeling of superiority over others that naturally follows. All these give the officer poise.

To lead, you must know—you may bluff all your men some of the time, but you can't do it all the time. Men will not have confidence in an officer unless he knows his business, and he must know it from the ground up.

The officer should know more about paper work than his first sergeant and company clerk put together; he should know more about messing than his mess sergeant; more about diseases of the

horse than his troop farrier. He should be at least as good a shot as any man in his company.

If the officer does not know, and demonstrates the fact that he does not know, it is entirely human for the soldier to say to himself, "To hell with him. He doesn't know as much about this as I do," and calmly disregard the instructions received.

There is no substitute for accurate knowledge. Become so well informed that men will hunt you up to ask questions; that your brother officers will say to one another, "Ask Smith—he knows."

And not only should each officer know thoroughly the duties of his own grade but he should study those of the two grades next above him. A twofold benefit attaches to this. He prepares himself for duties which may fall to his lot at any time during battle; he further gains a broader viewpoint which enables him to appreciate the necessity for the issuance of orders and join more intelligently in their execution.

Not only must the officer know but he must be able to put what he knows into grammatical, interesting, forceful English. He must learn to stand on his feet and speak without embarrassment.

I am told that in British training camps student officers are required to deliver ten-minute talks on any subject they may choose. That is excellent practice. For to speak clearly one must think clearly, and clear, logical thinking expresses itself in definite, positive orders.

While self-confidence is the result of knowing more than your men, *moral ascendency* over them is based upon your belief that you are the better man. To gain and maintain this ascendency you must have self-control, physical vitality and endurance and moral force.

You must have yourself so well in hand that, even though in battle you be scared stiff, you will never show fear. For if you by so much as a hurried movement or a trembling of the hand, or a change of expression, or a hasty order hastily revoked, indicate your mental condition it will be reflected in your men in a far greater degree.

In garrison or camp many instances will arise to try your temper and wreck the sweetness of your disposition. If at such times you "fly off the handle" you have no business to be in charge of men. For men in anger say and do things that they almost invariably regret afterward.

An officer should never apologize to his men; also an officer should never be guilty of an act for which his sense of justice tells him he should apologize.

Another element in gaining moral ascendency lies in the possession of enough physical vitality and endurance to withstand the hardships to which you and your men are subjected, and a dauntless spirit that enables you not only to accept them cheerfully but to minimize their magnitude.

Make light of your troubles, belittle your trials, and you will help vitally to build up within your organization an esprit whose value in time of stress cannot be measured.

Moral force is the third element in gaining moral ascendency. To exert moral force you must live clean, you must have sufficient brain power to see the right and the will to do right.

Be an example to your men. An officer can be a power for good or a power for evil. Don't preach to them—that will be worse than useless. Live the kind of life you would have them lead, and you will be surprised to see the number that will imitate you.

A loud-mouthed, profane captain who is careless of his personal appearance will have a loud-mouthed, profane, dirty company. Remember what I tell you. Your company will be the reflection of yourself. If you have a rotten company it will be because you are a rotten captain.

Self-sacrifice is essential to leadership. You will give, give all the time. You will give of yourself physically, for the longest hours, the hardest work and the greatest responsibility is the lot of the captain. He is the first man up in the morning and the last man in at night. He works while others sleep.

You will give of yourself mentally, in sympathy and appreciation for the troubles of men in your charge. This one's mother has died, and that one has lost all his savings in a bank failure. They may desire help, but more than anything else they desire sympathy.

Don't make the mistake of turning such men down with the statement that you have troubles of your own, for every time that you do *you knock a stone out of the foundation of your house.*

Your men are your foundation, and your house leadership will tumble about your ears unless it rests securely upon them.

Finally, you will give of your own slender financial resources. You will frequently spend your money to conserve the health and

well-being of your men or to assist them when in trouble. Generally you get your money back. Very infrequently you must charge it to profit and loss.

When I say that paternalism is essential to leadership I use the term in its better sense. I do not now refer to that form of paternalism which robs men of initiative, self-reliance and self-respect. I refer to the paternalism that manifests itself in a watchful care for the comfort and welfare of those in your charge.

Soldiers are much like children. You must see that they have shelter, food and clothing, the best that your utmost efforts can provide. You must be far more solicitous of their comfort than of your own. You must see that they have food to eat before you think of your own; that they have each as good a bed as can be provided before you consider where you will sleep. You must look after their health. You must conserve their strength by not demanding needless exertion or useless labor.

And by doing all these things you are breathing life into what would be otherwise a mere machine. You are creating a soul in your organization that will make the mass respond to you as though it were one man. And that is esprit.

And when your organization has this esprit you will wake up some morning and discover that the tables have been turned; that instead of your constantly looking out for them they have, without even a hint from you, taken up the task of looking out for you. You will find that a detail is always there to see that your tent, if you have one, is promptly pitched, that the most and the cleanest bedding is brought to your tent; that from some mysterious source two eggs have been added to your supper when no one else has any; that an extra man is helping your men give your horse a super-grooming; that your wishes are anticipated; that every man is "Johnny on the spot." And then you have arrived.

Fairness is another element without which leadership can neither be built up nor maintained. There must be first that fairness which treats all men justly. I do not say alike, for you cannot treat all men alike—that would be assuming that all men are cut from the same piece; that there is no such thing as individuality or a personal equation.

You cannot treat all men alike; a punishment that would be dismissed by one man with a shrug of the shoulders is mental anguish for another. A company commander who for a given offense has a standard punishment that applies to all is either too indolent or

too stupid to study the personality of his men. In his case justice is certainly blind.

Study your men as carefully as a surgeon studies a difficult case. And when you are sure of your diagnosis apply the remedy. And remember that you apply the remedy to effect a cure, not merely to see the victim squirm. It may be necessary to cut deep, but when you are satisfied as to your diagnosis don't be divided from your purpose by any false sympathy for the patient.

Hand in hand with fairness in awarding punishment walks fairness in giving credit. Everybody hates a human hog.

When one of your men has accomplished an especially creditable piece of work see that he gets the proper reward. *Turn heaven and earth upside down to get it for him.* Don't try to take it away from him and hog it for yourself. You may do this and get away with it, but you have lost the respect and loyalty of your men. Sooner or later your brother officer will hear of it and shun you like a leper. In war there is glory enough for all. Give the man under you his due. The man who always takes and never gives is not a leader. He is a parasite.

There is another kind of fairness—that which will prevent an officer from abusing the privileges of his rank. When you exact respect from soldiers be sure you treat them with equal respect. Build up their manhood and self-respect. Don't try to pull it down.

For an officer to be overbearing and insulting in the treatment of enlisted men is the act of a coward. He ties the man to a tree with the ropes of discipline and then strikes him in the face, knowing full well that the man cannot strike back.

Consideration, courtesy and respect from officers toward enlisted men are not incompatible with discipline. They are parts of our discipline. Without initiative and decision no man can expect to lead.

In maneuvers you will frequently see, when an emergency arises, certain men calmly give instant orders which later, on analysis, prove to be, if not exactly the right thing, very nearly the right thing to have done. You will see other men in emergency become badly rattled; their brains refuse to work, or they give a hasty order, revoke it; give another, revoke that; in short, show every indication of being in a blue funk.

Regarding the first man you may say: "That man is a genius. He hasn't had time to reason this thing out. He acts intuitively."

Forget it. "Genius is merely the capacity for taking infinite pains." The man who was ready is the man who has prepared himself. He has studied beforehand the possible situation that might arise, he has made tentative plans covering such situations. When he is confronted by the emergency he is ready to meet it.

He must have sufficient mental alertness to appreciate the problem that confronts him and the power of quick reasoning to determine what changes are necessary in his already formulated plan. He must have also the decision to order the execution and stick to his orders.

Any reasonable order in an emergency is better than no order. The situation is there. Meet it. It is better to do something and do the wrong thing than to hesitate, hunt around for the right thing to do and wind up by doing nothing at all. And, having decided on a line of action, stick to it. Don't vacillate. Men have no confidence in an officer who doesn't know his own mind.

Occasionally you will be called upon to meet a situation which no reasonable human being could anticipate. If you have prepared yourself to meet other emergencies which you could anticipate, the mental training you have thereby gained will enable you to act promptly and with calmness.

You must frequently act without orders from higher authority. Time will not permit you to wait for them. Here again enters the importance of studying the work of officers above you. If you have a comprehensive grasp of the entire situation and can form an idea of the general plan of your superiors, that and your previous emergency training will enable you to determine that the responsibility is yours and to issue the necessary orders without delay.

The element of *personal dignity* is important in military leadership. Be the friend of your men, but do not become their intimate. Your men should stand in awe of you—not fear. If your men presume to become familiar it is your fault, not theirs. Your actions have encouraged them to do so.

And, above all things, don't cheapen yourself by courting their friendship or currying their favor. They will despise you for it. If you are worthy of their loyalty and respect and devotion they will surely give all these without asking. If you are not, nothing that you can do will win them.

And then I would mention courage. Moral courage you need as well as physical courage—that kind of moral courage which

enables you to adhere without faltering to a determined course of action which your judgment has indicated as the one best suited to secure the desired results.

Every time you change your orders without obvious reason you weaken your authority and impair the confidence of your men. Have the moral courage to stand by your order and see it through.

Moral courage further demands that you assume the responsibility for your own acts. If your subordinates have loyally carried out your orders and the movement you directed is a failure, the failure is yours, not theirs. Yours would have been the honor had it been successful. Take the blame if it results in disaster. Don't try to shift it to a subordinate and make him the goat. That is a cowardly act.

Furthermore, you will need moral courage to determine the fate of those under you. You will frequently be called upon for recommendations for the promotion or demotion of officers and non-commissioned officers in your immediate command.

Keep clearly in mind your *personal integrity* and the duty you owe your country. Do not let yourself be deflected from a strict sense of justice by feeling of personal friendship. If your own brother is your second lieutenant, and you find him unfit to hold his commission, eliminate him. If you don't your lack of moral courage may result in the loss of valuable lives.

If, on the other hand, you are called upon for a recommendation concerning a man whom, for personal reasons, you thoroughly dislike, do not fail to do him full justice. Remember that your aim is the general good, not the satisfaction of an individual grudge.

I am taking it for granted that you have physical courage. I need not tell you how necessary that is. Courage is more than bravery. Bravery is fearlessness—the absence of fear. The merest dolt may be brave, because he lacks the mentality to appreciate his danger; he doesn't know enough to be afraid.

Courage, however, is that firmness of spirit, that moral backbone, which, while fully appreciating the danger involved, nevertheless goes on with the undertaking. Bravery is physical; courage is mental and moral. You may be cold all over; your hands may tremble; your legs may quake; your knees be ready to give way—that is fear. If, nevertheless, you go forward; if in spite of this physical defection you continue to lead your men against the enemy, you have courage. The physical manifestations of fear will pass away. You may never experience them but once. They

are the "buck fever" of the hunter who tries to shoot his first deer. You must not give way to them.

A number of years ago, while taking a course in demolitions, the class of which I was a member was handling dynamite. The instructor said regarding its manipulation: "I must caution you gentlemen to be careful in the use of these explosives. One man has but one accident." And so I would caution you. If you give way to the fear that will doubtless beset you in your first action, if you show the white feather, if you let your men go forward while you hunt a shell crater, you will never again have the opportunity of leading those men.

Use judgment in calling on your men for display of physical courage or bravery. *Don't ask any man to go where you would not go yourself.* If your common sense tells you that the place is too dangerous for you to venture into, then it is too dangerous for him. You know his life is as valuable to him as yours is to you.

Occasionally some of your men must be exposed to danger which you cannot share. A message must be taken across a fire-swept zone. You call for volunteers. If your men know you and know that you are "right" you will never lack volunteers, for they will know your heart is in your work, that you are giving your country the best you have, that you would willingly carry the message yourself if you could. Your example and enthusiasm will have inspired them.

And, lastly, if you aspire to leadership, I would urge you to *study men.*

Get under their skins and find out what is inside. Some men are quite different from what they appear to be on the surface. Determine the workings of their minds.

Much of General Robert E. Lee's success as a leader may be ascribed to his ability as a psychologist. He knew most of his opponents from West Point days, knew the workings of their minds, and he believed that they would do certain things under certain circumstances. In nearly every case he was able to anticipate their movements and block the execution.

You cannot know your opponent in this war in the same way. But you can know your own men. You can study each to determine wherein lies his strength and his weakness; which man can be relied upon to the last gasp and which cannot.

Know your men, know your business, know yourself.

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YIYKAEJR GZQSYWX[1]

By Wm. E. Beard

One of the most popular pastimes is puzzling over puzzles. The picture of the tree with the smiling features of an old gentleman awaiting discovery among the spreading branches holds a challenge for the worldly wise as well as for the young. Even the business man, after a trying day, may be counted on with some degree of certainty to turn from the first page war news to figure out the name of an important American city with the picture of an overflowing laundry basket and a cart load of coal as clues. But there are puzzles and puzzles. Some, like the old man in the tree, are made to be solved. Upon the ingenuity of the constructor of another kind of puzzle may hinge today the success of an army, the safety of a fleet, the destiny of a nation even.

When a nation goes to war the matter of safeguarding all information concerning military plans and operations becomes at once of vast importance. The censorship, with which every one is familiar, is one step in this direction. A step, with which the public generally is less familiar, concerns information that must pass between members of the nation's official family. Even the most trustworthy of dispatch-bearers is liable to capture, mails may be looted by sudden raiding parties, and telegraph lines may be tapped. After his "first Kentucky raid," Gen. John H. Morgan, the Confederate cavalryman, boasted that he had copies of every dispatch sent by the Federal commander at Louisville from July 10 to July 22, 1862.[2] In time of war therefore, where

[1] The title is written in the cipher of the Confederate Signal Corps; key-word, "Manchester Bluff."

[2] In Series 1, Volume 16, Part 1, page 780, War of the Rebellion Official Records may be found the following dispatch:

Somerset, Ky., July 22, 1862.

General J. T. Boyle, Louisville, Ky.:

Good morning, Jerry! This telegraph is a great institution. You should destroy it, as it keeps me too well posted. My friend Elsworth has all your dispatches since July 10 on file. Do you wish copies?

John H. Morgan,
Commanding Brigade.

such contingencies are apt to arise, ciphers must be resorted to for conveying messages containing military secrets. Such ciphers usually take the form of some cryptic arrangement of letters or figures calculated to escape solution by the enemy's intelligence department.

The average reader's ideas concerning messages in cipher are probably based upon his recollections of Edgar Allan Poe's story, "The Gold Bug," in which the hero discovers vast buried treasure through his ingenious interpretation of a cryptograph. In his explanation of the method of interpretation followed by his hero, it will be remembered that Poe lays down this rule:

> In English, the letter which most frequently occurs is E. Afterwards the succession runs thus: A O I D H N R S T U Y C F G L M W B K P Q X Z. E predominates so remarkably that an individual sentence of any length is rarely seen in which it is not the prevailing character.

Poe's hero located the character representing E in the cipher and quickly constructed the sentence directing him to the location of the treasure. The same method might prove effective in solving any such message where the characters used to represent the letters are stable. In a message, in which the letter Z represents A in one sentence and S or D in the next, it would be altogether ineffective.

The War of the Rebellion Official Records contain many references to devices adopted by the Confederate officers to conceal the meaning of messages from the enemy.

When Lieut. John N. Maffitt, commander of the C. S. cruiser *Florida*, was in Mobile preparing to make a dash through the blockade for the high seas, Stephen R. Mallory, Secretary of the Confederate Navy, sent him the following instructions:

> For the purpose of communicating with your government you will proceed as follows: Obtain at Mobile two uniform copies of any small English lexicon or dictionary, one to be retained by you and the other to be sent to the Department. Whenever in your letters or dispatches a word is used which may betray what you desire to conceal, instead of using that word write the numbers, in figures within brackets, of the page where it is to be found, and also the number of the word on the page, counting from the top. Thus, if you desire to indicate the word "prisoner" and should find this word on the hundredth page of the book and the tenth word from the top of the page, you would indicate it thus: (100) 10. In this manner you can use a cipher without the possibility of its detection.[3]

[3] Series 1, Volume 1, page 762, Official Records of the Union and Confederate Navies in the War of the Rebellion.

Making such a use of the dictionary seems to have been a favorite method of correspondence with the Confederate naval authorities, in the earlier years of the war at least. When Raphael Semmes, then commander but later rear admiral, was preparing for his cruise in the *Sumter* he was unable to locate in the New Orleans book shops a dictionary of the desired kind, that is, one having but a single column of words to the page. He therefore purchased copies of Reid's English Dictionary which had two columns. This necessitated an enlargement of the cipher scheme. In a letter to Secretary Mallory he proposed to designate the first column as "A," and the second column as "B" "Thus," he says, "if I wish to use the word 'prisoner,' my reference to it would be thus: '323, B, 15,' the first number referring to the page, the letter to the column, and the second number to the number of the word from the top of the column."[4]

A short time before the battle of Shiloh, Gens. Albert Sidney Johnston and G. T. Beauregard adopted a cipher that was quite simple, but probably effective for ordinary purposes. In this the significance of the letters of the alphabet changed from day to day. Johnston, in a letter from Decatur, Ala., on March 11, 1862, gave it to Beauregard thus:[5]

The day of the month on which it is written will indicate the letter of the alphabet corresponding with A. Yesterday, 10th, J—— A..... On the 27th of the month A will correspond to C.

Suppose one desired to write the American slogan of the present war—"To make the World safe for Democracy," in this cipher Written on Washington's birthday, V (the twenty-second letter) would represent A, W would represent B, and so on, and the slogan would look like this—

OJHVFZOCZRJMGYNVAZAJMYZHJXMVXT.

On the other hand, if the slogan were written on July 4, an entirely different group of letters would be the result, viz.,

WRPDNHWKHZRUOGVDIHIRUGHPRFUDFB.

While he was commanding the Confederate Department of South Carolina, Georgia and Florida, with headquarters at Charles-

[4] Series 1, Volume 1, pages 615-616, Official Records of the Union and Confederate Navies in the War of the Rebellion.

[5] Series 1, Volume 10, Part 2, page 310, War of the Rebellion Official Records.

ton, General Beauregard sent Maj. Gen. Patton Anderson at Baldwin, Fla., on April 7, 1864, a simple form of cipher to be used in the transmission of important telegrams passing between the two. This was nothing more than an arbitrary switching of the letters of the alphabet, the various letters being represented as follows:[6]

A by M	H by R	O by U	U by F
B K	I S	P I	V Q
C O	J V	Q G	W D
D A	K H	R Y	X T
E N	L X	S E	Y B
F C	M P	T Z	Z J
G W	N L		

Example: Charleston—Ormyxnezul.

The burden of a song made very familiar since the world war began, expressed in this cipher, would appear as follows:[7]

S Z' E M X U L W D M B Z U Z S I I N Y M Y B,
K F Z P B R N M Y Z' E Y S W R Z Z R N Y N.

The weakness in both the Johnston-Beauregard cipher and the Beauregard-Anderson cipher lies in the fact that a clever student of Poe might find them comparatively easy of solution.

The cipher in use in the Confederate Signal Corps was an entirely different matter from these simpler combinations. It was entirely beyond solution by any rule of frequency such as Poe applied, for the reason that no letter represented the same letter in two different words or in a single word. Early in the year 1865 Acting Master J. B. Devoe, U. S. Navy, sent a description of it to G. V. Fox, Assistant Secretary of the Navy, with an explanation of its use.[8] The following was the arrangement of the letters of the alphabet:

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[6] Series 1, Volume 35, Part 2, pages 406-407, War of the Rebellion Official Records.

[7] "It's a long way to Tipperary,
But my heart's right there."

[8] Series 1, Volume 22, pages 9-10, Official Records of the Union and Confederate Navies in the War of the Rebellion.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
B C D E F G H I J K L M N O P Q R S T U V W X Y Z A
C D E F G H I J K L M N O P Q R S T U V W X Y Z A B
D E F G H I J K L M N O P Q R S T U V W X Y Z A B C
E F G H I J K L M N O P Q R S T U V W X Y Z A B C D
F G H I J K L M N O P Q R S T U V W X Y Z A B C D E
G H I J K L M N O P Q R S T U V W X Y Z A B C D E F
H I J K L M N O P Q R S T U V W X Y Z A B C D E F G
I J K L M N O P Q R S T U V W X Y Z A B C D E F G H
J K L M N O P Q R S T U V W X Y Z A B C D E F G H I
K L M N O P Q R S T U V W X Y Z A B C D E F G H I J
L M N O P Q R S T U V W X Y Z A B C D E F G H I J K
M N O P Q R S T U V W X Y Z A B C D E F G H I J K L
N O P Q R S T U V W X Y Z A B C D E F G H I J K L M
O P Q R S T U V W X Y Z A B C D E F G H I J K L M N
P Q R S T U V W X Y Z A B C D E F G H I J K L M N O
Q R S T U V W X Y Z A B C D E F G H I J K L M N O P
R S T U V W X Y Z A B C D E F G H I J K L M N O P Q
S T U V W X Y Z A B C D E F G H I J K L M N O P Q R
T U V W X Y Z A B C D E F G H I J K L M N O P Q R S
U V W X Y Z A B C D E F G H I J K L M N O P Q R S T
V W X Y Z A B C D E F G H I J K L M N O P Q R S T U
W X Y Z A B C D E F G H I J K L M N O P Q R S T U V
X Y Z A B C D E F G H I J K L M N O P Q R S T U V W
Y Z A B C D E F G H I J K L M N O P Q R S T U V W X
Z A B C D E F G H I J K L M N O P Q R S T U V W X Y

Devoe's note of explanation of the cipher read:

The new key is not known.

The new key-word is "Complete Victory."

The old key was "Manchester Bluff," to be used as follows:

Write under each letter of the message to be sent the letter of the key-word, repeating it as often as the number of letters in each sentence of the message requires and always commencing a new sentence with the first letter of the key word.[9] Find in the table the first of the message perpendicularly under the letter A. Then find the first letter of the key-word horizontally opposite A. The letter at the intersection of the horizontal and perpendicular columns starting from the two letters thus found will be the cipher letter to be written in place of the true letter. The same process is required for each letter when the message becomes complete.

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[9] In saying that the first letter of the key-word should be used with the beginning of each new sentence of a message, Devoe must have been in error. The writer referred this question to Charles W. Stewart, Superintendent of Naval Records and Library, who replied: "I am fairly certain that Devoe made a slip in describing the use of the key-word and that the letters of the key-word are used without regard to sentences or paragraphs, inasmuch as this method has been used with two key-words, making a double cipher."

To interpret such a cipher the process must be reversed. Write as before the letters of the key-word under those of the cipher. Take the first letter of the key-word in the table opposite A and trace down that column till the first letter of the cipher is found. The letter opposite this and perpendicularly under A will be the first of the message. So on till the message is completed.

While in front of Vicksburg, Miss., General Grant's troops captured a small party of Confederates who were attempting to carry percussion caps into the beleaguered city. On one of them was found the following message:[10]

JACKSON (MISS.), May 25, 1863.

Lieutenant-General Pemberton:

My X A F V. U S L X was V V U F L S J P by the B R C YA (I)[11] J 200,000 V E G T. S U A J. N E R P. Z I F M. It will be G F O E C S Z O[11] (Q) D as they N T Y M N X. Bragg M J T P H I N Z G a Q R[11] (K) C M K B S E. When it D Z G J X. I will Y O I G. A S. Q H Y. N I T W M do you Y T I A M the I I K M. V F V E Y. How and where is the J S Q M L G U G S F T V E. H B F Y is your R O E E L.

J. E. JOHNSTON.

This message was written in the cipher of the Confederate Signal Corps with "Manchester Bluff" as the key-word. The intricacies of it are manifest in a glance at the last word of the message "R O E E L." The first "E" in this word represented "R" and the succeeding "E" represented "C," the word itself being "force."

General Grant sent the cipher message to the adjutant general's office at Washington in hopes that some one at the capital might be able to interpret the dispatch. The War Department made the following translation:

My ..... was captured by the picket. Two hundred thousand caps have been sent. It will be continued as they arrive. Bragg is sending a division. When it joins I will come to you. Which do you think the best route? How and where is the enemy operating? What is your force?

The translation in the essential features of the message was remarkably accurate, considering that the deciphering was done by the enemy and considering the fact that a careless dispatch writer or copyist had made three errors in transcribing the message. The important military points brought out in the message

[10] Series 1, Volume 24, Part 1, pages 39-40, War of the Rebellion Official Records.

[11] The letter in parenthesis is the correct cipher letter; the letter preceding was an error of the Confederate dispatch writer or of Grant's headquarters in making a copy.

were that Bragg was sending a division and when it arrived Johnston would advance to Pemberton's relief. In the War Department translation these facts were stated. In some of the immaterial parts of the message the translator's work was not so good, as will be seen by comparing it with the following translation of the War Records Publication Board:

My last note was returned by the bearer. Two hundred thousand caps have been sent. It will be continued as they arrive. Bragg is sending a division. When it comes I will move to you. Which do you think the best route? How and where is the enemy encamped? What is your force?

To demonstrate the manner of translating the cipher—

Over the cipher letters of the message write the letters of the key-word "Manchester Bluff," as follows:

MANCHEST ERBLUFFM ANCHES
"My XAFVUSLX was VVUFLSJP by the BRCYIJ"

In the top row of letters in the table find the first letter of the key-word, "M"; then run down the column of letters under "M" until the first cipher letter of the message "X," underneath it is reached. The "X" locates the horizontal row of letters in which is to be found the real letter in the column of letters headed by the letter "A." In this message the real letter as will be seen is "L."

In arriving at the second real letter, it will be seen that the key letter is "A" and the cipher letter is "A," which fact establishes the real letter to be the "A" at the beginning of the table of letters.

"N" of the key-word fixes the vertical column in which to seek the cipher letter "F," and the latter is found in the nineteenth horizontal row of letters. The row ends in the letter "S" of the first vertical column, which is the real letter. And so on. The full sentence translated letter by letter would look thus:

MANCHEST ERBLUFFM ANCHES
"My XAFVUSLX was VVUFLSJP by the BRCYIJ"
LASTNOTE RETURNED BEARER

The cipher is easily grasped, and possibly one of the commendable features of it was the simplicity of it when understood. Any staff officer with a drum-head for a writing desk could sit down on a log in the woods and have his cipher table ready for business in the time that it takes to tell of it, and be prepared to transcribe an important message into the secret cipher, or to translate a cipher message into plain English. It must be confessed, however,

either transcribing or translating is a little tedious. With shells shrieking about one's quarters, or exploding over one's shoulder, transcribing or translating such messages would no doubt become rather irksome, but doing such things with a clear head and a steady hand even under the most trying circumstances was then and is now the task of a soldier.

The ciphers of the Confederacy herewith described are not likely to be used or be encountered by the American soldiers of today in the course of their tour of duty. It is not improbable however that the information conveyed may be of service to some one of them, somewhere, sometime; that is, the basic idea involved may be of value. This is especially true of the dictionary code employed by the Confederate Naval Department. According to Lincoln's "Revelations of an International Spy" (1916), the dictionary code is still in use on the continent pretty much as Commander Semmes of the C. S. S. *Sumter* proposed to use it—the first number representing the page, the second number the column, and the third the word's place in the column. A more recent writer on the subject of German plots, John R. Rathom, has by the way had the Kaiser's government substituting for a dictionary the New York World Almanac.

So far as the general reader is concerned, this modest lesson in cipher dispatches may serve to heighten his appreciation of the next story he reads in which a crafty spy is cast as the heavy villain.

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THE NAVY AND FILIBUSTERING IN THE FIFTIES

(CONTINUED)

By LOUIS N. FEIPEL

V. WALKER'S SURRENDER TO PAULDING IN 1857

While the foregoing events were taking place, another movement upon Nicaragua was being planned in the United States. Various attempts had been made, from time to time, to found colonies in the lands granted by His Mosquitian Majesty, but they had uniformly failed. Finally, in 1852, the titles were purchased conditionally by one Henry L. Kinney, who, relying on these titles, turned up at Greytown toward the end of 1854. After Walker's entrance into Nicaragua, in 1855, Kinney agreed to recognize him as commander-in-chief of the Nicaraguan Army, if Walker in turn would recognize him as governor of the Mosquito Territory. Walker, however, replied: "Tell Mr. Kenny, or Colonel Kenny, or Governor Kenny, or whatever he likes to call himself, that if he interferes in the affairs of Nicaragua, and I get hold of him, I will most assuredly hang him."[1]

In 1856, Kinney was placed under arrest on a charge of treason, and forced to surrender his governorship. But in 1857, after Walker had been arrested by Commander Davis, he managed to interest some English Mormons in his grant, and one of their agents agreed to buy one-half of the territory. On the strength of this agreement, Kinney borrowed a sum of money from some Panama merchants, and with several companions sailed to Greytown, where he landed on April 19, 1858. They attempted to take possession of the government, but were arrested and placed in the guard-house. Captain C. H. Kennedy, of the United States sloop-of-war *Jamestown*, then intervened in their behalf, and received the prisoners on board his vessel, after they had given their solemn promise in writing not to return to Grey-

[1] Wraxall, Remarkable Adventurers (1863), ii, 271.

town except with peaceful intentions toward the local authorities. Kinney then went to Aspinwall, and from there took passage to the United States.

In the fall of 1857, also, rumors of the new expedition against Nicaragua, under the command of Walker, became current in the United States. The two Central American representatives in Washington—Irisarri and Molina—at once notified Secretary of State Cass of the enterprise, and begged the American Government to prevent the landing of the expedition at any Central American port, in case its departure from the United States could not be prevented. Cass immediately sent a circular letter to all the United States marshals, district attorneys, and collectors of the ports of the Southern and seaboard states, notifying them of the projected expedition, and urging them to be diligent in enforcing the law. This circular read as follows:

DEPARTMENT OF STATE,
WASHINGTON, September 18, 1857.

SIR: From information received at this Department, there is reason to believe that lawless persons are now engaged within the limits of the United States in setting on foot and preparing the means for military expeditions to be carried on against the territories of Mexico, Nicaragua, and Costa Rica, republics with whom the United States are at peace, in direct violation of the sixth section of the act of Congress, approved 20th April, 1818. And, under the eighth section of the said act, it is made lawful for the President, or such person as he shall empower, to employ the land and naval forces of the United States, and the militia thereof, "for the purpose of preventing the carrying on of any such expedition or enterprise from the territories or jurisdiction of the United States." I am, therefore, directed by the President to call your attention to the subject, and to urge you to use all due diligence to avail yourself of all legitimate means at your command to enforce these and all other provisions of the said act of 20th April, 1818, against those who may be found to be engaged in setting on foot or preparing military expeditions against the territories of Mexico, Costa Rica, and Nicaragua, so manifestly prejudicial to the national character and so injurious to the national interest. And you are also hereby instructed promptly to communicate to this Department the earliest information you may receive relative to such expeditions.

I am, sir, your obedient servant,

LEWIS CASS.

Copies of this circular were sent, at the same time, by Secretary of the Navy Toucey, to the commanders of vessels in Central American waters, as well as to the commandants of the navy-yards at Portsmouth, New York, Boston, Philadelphia, Norfolk,

Pensacola, and San Francisco.[2] The steamer *Fulton*, under the command of Lieutenant John J. Almy, was ordered to touch at Mobile and New Orleans, on her way to Central America. Almy was instructed to report to the Department what he could learn in those cities concerning the probable departure of the filibusters. He likewise carried the instructions to the other naval officers in the Caribbean with regard to the enforcement of the neutrality law.

To every naval officer these instructions were exceedingly vague, as they were originally intended only for civil officers in American ports. Almy, accordingly, before sailing, wrote for a fuller explanation of his duties in carrying out his instructions. The questions he asked were doubtless uppermost in the minds of all his fellow officers stationed in Central American ports. Since the neutrality law applied only to ports of the United States, or to those under its jurisdiction, were they to seize a suspicious vessel in a foreign port, or merely prevent its passengers from landing? Again, what were they to do if the passengers informed them that they were travellers intending to cross the Isthmus, or were merely peaceable settlers? The Secretary's reply was not very enlightening. "Naval officers," he wrote, "were not to act arbitrarily, or on mere suspicion, and they were to be careful not to interfere with lawful commerce; but where a vessel was manifestly engaged in filibustering, they were to use the force at their command to prevent men and arms from being landed."[3] As a matter of fact, the stationing of American men-of-war in foreign ports to enforce the laws of the United States was such an anomalous proceeding, that no cabinet officer could have given specific directions as to the exact procedure that should be followed.

After reaching Mobile, Almy heard rumors of a filibustering expedition, but could learn nothing sufficiently tangible to justify official action. He found public sentiment very favorable to the movement, and there was a general opinion that the Washington administration was disposed to wink at such enterprises. This impression Almy strove to correct. He also found that the finan-

[2] Our war-vessels in Central American waters at that time were: The steam-frigate *Wabash*, Commodore Hiram Paulding; the sloop-of-war *Saratoga*, Commander Frederick Chatard; and the sloop-of-war *Decatur*, Commander Henry K. Thatcher.

[3] Senate Doc. No. 13, 35th Cong., 1st Sess.

cial distress was then so acute that the contemplated movement was seriously hampered by a lack of funds. Similar conditions prevailed at New Orleans, and Almy reported his findings to the Secretary of the Navy, after which the *Fulton* proceeded to her destination.

The visit of the *Fulton* to Mobile and New Orleans evidently had the effect of conveying the idea that the government was in earnest, and was exercising a watchful eye over these reported expeditions; in short, that it would make the filibusters extremely cautious in their proceedings. The leaders of the movement accordingly managed their affairs in such a way as to deceive Captain Almy, and, after his arrival at Chiriqui, about November 10, he informed Commodore Paulding that filibusterism was dead, and that there was not the least possibility of Walker's leaving the United States with his followers.[4]

The contemplated expedition did, however, manage to sail shortly afterwards, and succeeded in reaching Nicaragua in spite of the vigilance of the steam frigate *Susquehanna*, which had been ordered to proceed from Key West to Honduras, and to cruise along the coast from Cape Gracias to Greytown. On November 25, 1857, the filibusters, on board the steamer *Fashion*, sailed boldly into the harbor of Greytown, and the greater portion of the men (about 150) were landed on Punta Arenas. This landing took place under the very eyes of the officers on the sloop-of-war *Saratoga*, which had been stationed in the harbor to prevent just such an occurrence. It seems that Commander Chatard's suspicions were entirely lulled when the filibuster steamer came in so boldly and passed so near to him, showing only about 15 men on deck. Great was his chagrin, however, when he saw several hundred men, armed with rifles, being landed. He was now confronted with the same problem which had puzzled Almy. He did not wish to open fire on the vessel in a neutral port, and so stop the disembarkation; and he realized also that once the men had landed, he would have no jurisdiction over them.[5] In great

[4] Meade, "Life of Paulding," 195.

[5] It does not clearly appear whether the supplemental instructions of October 12 to Lieutenant Almy were communicated to Commodore Paulding and Commander Chatard or not, but inasmuch as Almy reported to Commodore Paulding as early as the 10th of November, on his way to Chiriqui, it may be presumed they were.—Senate Rept. No. 20, 35th Cong., 1st Sess.

perturbation he wrote to Commodore Paulding, at Aspinwall, urging him to come to Greytown at once. He reported to Paulding, in part, as follows:

> My crew, as I told you, I consider too inefficient to do anything but use the big guns. I might blow steamers and all to pieces, but I do not feel the circular gives me the authority; it is too obscure in its directions to admit of my proceeding to such an extreme—the only way in which I could interfere. The vessels come properly cleared for Greytown, and pronounced all right before sailing from the United States, and I cannot, in my opinion, pronounce them wrong and legally act against them.[6]

Accompanying this official communication, Chatard sent Paulding a private letter bewailing his own stupidity in allowing the filibusters to outwit him. "Somehow or other," he wrote, "I was spellbound, and so my officers seemed to be. . . . . I beg you, sir, in the most earnest manner, to come here and advise me. I am in a very cruel state of mind, and look gloomily to the future."[7]

About the same time, General Walker sent a letter to Paulding complaining that Commander Chatard was subjecting him to petty annoyances. On the ground of protecting American property, Chatard had refused to allow the filibusters to occupy the buildings of the Transit Company on the Point. Some of the *Saratoga's* officers, not in uniform, he declared, had entered the filibuster camp without noticing the sentry's challenge. Target practice with howitzers was carried on so close to Walker's camp that a stray shot might have caused serious trouble. And, finally, Chatard had notified Walker that his camp was in the way of any shot the *Saratoga* might have to fire in order to bring-to a suspicious vessel, and that the camp must therefore be moved. Walker, it seems, had already moved part of his camp to avoid danger from Chatard's target practice, and so he paid no attention to this last demand. Piqued at being foiled by the filibusters, Chatard vented his spite in these petty ways, in the hope that he would provoke them to commit some act that would justify him in interfering and breaking up the expedition, and thus retrieve to some extent his blunder in allowing the filibusters to land.

On the 30th of November, a brig bearing Sardinian colors, and having the Nicaraguan flag at the fore, entered the harbor of

[6] House Exec. Doc. No. 24, 35th Cong., 1st Sess.
[7] MS. Archives, Navy Dept., Home Squadron, ii, 58.

Greytown. Soon after she rounded the Point, a number of armed boats pulled off from the *Saratoga* towards the brig, and an officer boarded her. It was plain, therefore, that Chatard, by treating vessels in the harbor precisely as if they were on the high seas, was attempting to maintain the police of the port in derogation of the territorial rights of Nicaragua. And on December 2, Chatard also notified Walker to the following effect: "I am determined to bring all vessels to, that I may fully inquire into their character."

In the meantime the *Fulton* arrived at Aspinwall, by way of Chiriqui, and Lieutenant Almy reported to Paulding, as instructed. Paulding, resenting the fact that Almy, in the *Fulton*, had been ordered to Chiriqui, instead of being first sent to report to him at Aspinwall, wrote to Secretary Toucey, under date of October 20, as follows:

> The Department will not fail to observe that my feelings as commander-in-chief of this squadron must be very much wounded when I say that the service of the government could have been better performed if Commander Almy had been sent to me, and some discretion had been given me by the Department for employing the force nominally under my command, instead of its being assigned to duties at a distance from home by the government, whom [who] it is impossible should so well understand the localities and the most proper measures to be taken for a given purpose. . . . . In my judgment, it would be better for the Department to supersede an officer whenever it wants confidence in his capacity for command. . . . . It will be apparent to the Department that I must feel that my prerogatives, as commander-in-chief of the squadron, are turned aside with but little consideration, and that my presence here can have but a slight appreciation. . . . . Without presuming to intrude discourteously upon the Department, it is proper that I should present my views, and, in doing so, to say that the duties of this command cannot be discharged in a manner due to the good order and efficiency of the naval service unless the Department shall be observant, and exact of the officers a strict conformity to its military character. . . . .[8]

To this astounding letter, Secretary Toucey replied:

> It was not the intention of the Department to intimate any doubt of your knowledge or capacity, or of your disposition promptly to discharge any duty assigned to you. But the Department will reserve to itself the right, under the immediate direction of the President, to despatch a vessel to any point, upon any emergency, under specific instructions, directing its commanding officer to report to the flag officer of any squadron subject to those instructions.[9]

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[8] House Exec. Doc. No. 24, 35th Cong., 1st Sess.
[9] *Ibid.*

As soon as Paulding received the letters of Chatard and Walker, he made ready to go to Greytown, where he arrived on December 6. The *Wabash*, his flagship, anchored just outside the harbor—which was too shallow for her draft—and directly opposite the filibuster camp. On the next day, the *Fulton* arrived, making three American men-of-war off the Point. On the same day, the British steam frigate *Leopard* and the monster ship-of-war *Brunswick* anchored near the American men-of-war. The arrival of so many war-vessels caused the filibusters no little apprehension. But as the hours passed, and nothing untoward happened, Walker believed that the American vessels were there only to watch the British, and to prevent any interference from that quarter. During the day, several boats put out from the *Saratoga* and proceeded up the river; but as these were supposed to be watering parties, they attracted no particular attention, except from the experienced filibusters, who noted that the boats did not come back. Shortly after midnight, Walker quietly sent Fayssoux up the river in a canoe to learn the object of the boat expedition. He found that the boats were maintaining a blockade. This information was kept from the other filibusters, but the next morning Fayssoux and Hornsby were sent to Paulding to protest. Paulding told them that the river had been blockaded to prevent Walker's men from ascending it, and that he intended making all the men prisoners and carrying them back to the United States.

Preparations were at once made for landing a force on the Point. On December 8, 300 marines and sailors were sent on board the *Fulton*, the smallest of the American warships, to which Paulding then transferred his flag, and she was taken into the Transit Company's wharf. There the men were landed, under circumstances of great difficulty, while the ship, in a heavy seaway, was rolling her scuppers to the water. The work of getting out the boats, and arming, was attended with great labor and almost insuperable difficulty, yet everything was done in so seamanlike and skilful a manner, that it was accomplished in the shortest possible time, without loss or accident. Lieutenant Sinclair superintended the general duty of the ship, and when the marines and seamen were embarked in the *Fulton*, took command and direction of the howitzer barges, and deployed them in their position in the harbor on the left of Walker's camp. The marines

of the squadron, commanded by Lieutenants Lewis and Payne, and three divisions of seamen from the *Wabash,* with small arms, and commanded by Lieutenants Fairfax, Beaumont, and Paulding, landed and deployed in order of battle on the right and rear, all exhibiting the skill and tactics of practiced troops. The force amounted in all to about 350. When these arrangements had been made, and the broadside of the *Saratoga* sprung to bear on the front, there was no chance of successful resistance on the part of the filibusters. The demonstration of superior force was well managed, and Walker, familiar with the events of the preceding night, was not surprised at the movement.

Before Paulding's arrangements were altogether completed, Walker dismissed his guard and disbanded his military organization, telling some of his more impetuous followers, who were spoiling for a fight, that resistance would be the height of folly. Paulding next sent Captain Engle to Walker with a written demand for his surrender. The two met and shook hands, and Engle delivered his communication. The letter read, in part, as follows:

> The mistake he [Chatard] made was in not driving you from the Point Arenas when you landed there in defiance of his guns.
>
> In occupying the Point Arenas and assuming it to be the headquarters of the army of Nicaragua, and you its commander-in-chief, you and your associates being lawless adventurers, you deceive no one by the absurdity.
>
> Lieutenant Cilley, of the *Saratoga,* informs me that he was in uniform, and you say he was in plain clothes, when you threatened to shoot him.
>
> Whilst you use such threats, it may be of some importance for you to know that if any person belonging to my command shall receive injury from your lawless violence, the penalty to you shall be a tribute to humanity.
>
> Now, sir, you and your followers are here in violation of the laws of the United States, and greatly to its dishonor, making war upon a people with whom we are at peace; and for the sake of humanity, public and private justice, as well as what is due to the honor and integrity of the government of the United States, I command you, and the people associated here with you, to surrender your arms without delay, and embark in such vessels as I may provide for that purpose. . . .[10]

[10] House Exec. Doc. No. 24, 35th Cong., 1st Sess. The effect of this letter upon the people of Washington, when it was first published in the United States, about December 27, 1857, is thus recorded by one of Paulding's friends: "As to your letter to Walker, its stern and terse Anglo-Saxon spirited phrases are in every one's mouth, especially the delicate and new method of stating the hanging alternative." (See Meade, 199.)

Walker read the letter without changing a muscle of his face, and then remarked: "I surrender to the United States." Engle then asked him to lower his flag, and Walker ordered one of his officers to do so. After further conversation, Engle remarked: "General, I am sorry to see an officer of your ability employed in such a service. Nothing would give me greater pleasure than to see you at the head of regular troops."[11] Engle then ordered the naval forces back to the ships, and returned to the *Fulton*.

Several oral messages now passed between Paulding and Walker, and one of these, misunderstood by the bearer, greatly offended the commodore. It seems he had tried to show Walker some consideration, and had sent him word that the officers and men would have separate quarters. Walker replied that he was asking no special benefits, and Paulding, regarding this as a piece of impudence, ordered Walker's immediate embarkation on the *Fulton*. What followed may best be told in Paulding's own words, as contained in a letter to his wife:

> Upon this he came to see me, and this lion-hearted devil, who had so often destroyed the lives of other men, came to me, humbled himself, and wept like a child. You may suppose it made a woman of me, and I have had him in the cabin since as my guest. We laugh and talk as though nothing had happened, and you would think, to see him with the captain and myself, that he was one of us. He is a smart fellow, and requires a sharp fellow to deal with him.[12]

There was something almost dramatic in the meeting of these two men for the first time, and the officers and crew could barely conceal their excitement as the filibuster chieftain stepped on the deck of the *Fulton*. The gigantic frame of the commodore in uniform contrasted strangely with the slight figure of the general in somber civilian garb; and observers noted that Walker's eyes were very red, an indication, as Paulding himself has testified, that his emotions had gotten the better of him.

It was the irony of fate that just as Walker surrendered to Engle, and his red-starred flag was hauled down, a belated river steamer, the *Morgan*, which had gone aground 12 miles up-

[11] Another version of this dialogue has it that Captain Engle said to Walker: "General, I am sorry to see you here. A man like you is worthy to command better men." To which Walker is said to have grimly replied: "If I had a third the number you have brought against me, I would show you which of us two commands the better men." (Davis, "Real Soldiers of Fortune.")

[12] Meade, "Life of Paulding," 190.

stream, came in sight, having 12 filibusters and 30 Costa Rican prisoners on board. A detachment of United States marines seized the boat, liberated the prisoners, captured the filibusters, and placed the steamer in the keeping of the United States commercial agent at Greytown. Mr. C. J. McDonald, the agent of Morgan and Garrison, who had accompanied Walker to Nicaragua, claimed the *Morgan* on behalf of his principals, but Paulding recognized him as one of the filibusters, and sent him on board the *Saratoga*.[11]

When Walker surrendered, some 40 of his men took to the chaparral, intending to make their way up the river and join Colonel F. P. Anderson, one of Walker's lieutenants. On the following day, the marines beat around the dense undergrowth, and by night had rounded up 32 of the men. The rest had taken a boat and gone up the river. On the night after the surrender, the denizens of Greytown came over and plundered the camp to their heart's content. A few stores that remained were placed on board the *Wabash* to be turned over to the United States authorities.

The officers and men, with the exception of Walker and one other, were placed on board the *Saratoga*, and on the 12th of December, less than a month after their departure from Mobile, they were on their way back to the United States. Walker was not placed on board the *Saratoga*, on account of the ill-feeling between him and Commander Chatard. The *Saratoga* took the men and officers to Norfolk, while the *Wabash* returned to her station at Aspinwall.

Walker gave his parole to Paulding to return to the United States on the regular mail steamer, and to surrender himself on reaching New York to the United States marshal. His conduct on the *Wabash* was in complete contrast with his attitude toward the officers of the *St. Mary's* after his surrender to Davis. On that vessel he had been morose, insolent, and overbearing, while he was now genial and conciliatory. As Paulding reached Aspinwall five days before the scheduled departure of the New York steamer, he endeavored to persuade Walker to remain on board the *Wabash*, where he would have had better quarters than on shore; but Walker declined to remain even for another meal after the vessel cast anchor, and took a room at one of the town's indifferent hotels.

[11] Meade, p. 197.

When the *Wabash* steamed away from Greytown, Colonel Anderson was still up the river. The *Fulton* was therefore sent to the mouth of the Colorado, and the *Susquehanna*, Captain Joshua R. Sands, which had just arrived, was stationed at the mouth of the San Juan, thereby preventing the escape of Anderson and his men, as well as the landing of any reinforcements for Walker that might be on their way from the United States. On hearing of Walker's capture, Anderson abandoned his stronghold and placed his force on board the steamer *Ogden*. On December 20, he sent a letter to Captain Sands, stating that he wished to disband his command, and inquiring whether they would be permitted to enter Greytown. Most of them, he stated, wished to return to the United States. Sands replied that he would send back to the United States any man who would surrender to him on board his ship. On the 24th, Sands took his boat's crews up the river and captured the remaining filibusters on the *Ogden*. Anderson surrendered under protest. The command, numbering 45, were taken to Aspinwall, in the *Fulton*, and there transferred to the *Wabash*. Paulding set them ashore at Key West, and Walker's third filibustering expedition was likewise a thing of the past.

The intelligence of the capture of Walker and his followers was received by the government of Nicaragua with much satisfaction. In the name of the Republic, Maximo Gerez, General of the Nicaraguan forces, extended his thanks to Paulding on board the *Wabash*, in January, 1858. The Minister Plenipotentiary of Nicaragua in Washington was also expressly directed to make known to the government of the United States that Nicaragua approved with full satisfaction the capture, on its own territory, of the filibusters by the naval forces under Paulding. Directions were further given that its assent to that incursion should be published in all the journals of the United States; and the Central American press republished it with the greatest enthusiasm."

Chatard, as we have seen, had held that it was not "due diligence" or legitimate means to arrest the *Fashion* within a foreign port. In this construction of his orders he was not sustained, but, with marked severity, was suspended from his command and ordered to return to the United States, there to await the action of the Navy Department. The punishment of this officer, for his doubts, was thus communicated to Commodore Paulding by the Secretary of the Navy, under date of December 18, 1857:

[11] Senate Exec. Doc. No. 10, 35th Cong., 2d Sess.

Should the *Saratoga* not have left before you receive this, you will suspend Commander Chatard from his command, and order him to return to the United States to await the further action of the Department. You will then place Lieutenant George S. Sinclair in command of the *Saratoga*, with directions to carry out the instructions to Commander Chatard, of the 16th ultimo, to proceed to Norfolk.[15]

But Chatard had already left, with the *Saratoga*, about December 12, and arrived at Norfolk on January 1, 1858.

This suspension of Commander Chatard was accompanied by new orders to Commodore Paulding, enjoining "particular vigilance." These orders read, in part, as follows:

The three points which it is most important to guard are Aspinwall, Chiriqui, and San Juan del Norte, and with this [in] view you will dispose of the forces under your command to the best advantage. The President directs me to inform you that he considers it all-important that you should not leave the neighborhood of these points until further instructed by the Department, which you are hereby ordered not to do under any circumstances.[16]

The vessel bearing this despatch arrived at Aspinwall on the 31st of December. But the communication, having been directed to Greytown instead of Aspinwall, had been left at Kingston, Jamaica, thence forwarded to St. Thomas, thence to Greytown and Aspinwall, finally reaching Paulding at his residence in Huntington, Long Island, on March 17, 1858, some time after he had been relieved of command of the Home Squadron. As it was, Paulding arrived at Key West, on board the *Wabash*, on January 17, 1858. There the prisoners taken on the San Juan River by Captain Sands were delivered over to the custody of the marshal of that district, to undergo examination. On February 9, the *Wabash* sailed for New York, and on the 18th, Paulding was detached from command of the Home Squadron.[17]

The first orders detaching Paulding from the command of the Home Squadron read as follows: "You are hereby detached from the command of the Home Squadron, and a leave of absence is granted to you for three months, at the expiration of which you will report to this department [the Navy Department]." This order was subsequently withdrawn, however, lest it might be misunderstood as a reprimand and suspension; and the following order, addressed "Flag Officer Hiram Paulding, Commanding Home Squadron, New York," was substituted: "Having been over two years in command of the Home Squadron, you are hereby detached from that command, and you will regard yourself as on leave of absence for three months."

[15] House Exec. Doc. No. 24, 35th Cong., 1st Sess.

[16] Senate Exec. Doc. No. 63, 35th Cong., 1st Sess.; also, Meade, 191.

[17] Senate Exec. Doc. No. 63, 35th Cong., 1st Sess.

[TO BE CONTINUED]

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Change in Board of Control

Captain W. H. Standley, U. S. Navy, was selected as a member of the Board of Control by the Board to fill the vacancy created by the resignation of Brigadier General John A. Lejeune, U. S. M. C.

Ballots for Election of Officers

Members are requested to return the signed ballots for the election of officers of the U. S. Naval Institute, 1918-1919.

Dues

Regular and associate members of the U. S. Naval Institute are subject to the payment of the annual dues until the date of the receipt of their resignation.

Book Announcements

Routine Book, 1918, by Captain Reginald R. Belknap, U. S. Navy, will be ready for issue about August 1. The *Routine Book* in a concise form comprises the general features of organization, administration and ordinary station bills in the service and is applicable to all classes of vessels. Unbound copies of the *Routine Book* for bulletin board purposes may be obtained if desired. The table of contents may be found in the book list.

Seamanship Department Notes containing new Mooring Board problems and The Landing Force Manual, U. S. Navy, 1918, are now ready for issue.

Prize Essays 1919

The attention of all the members and the subscribers to the U. S. NAVAL INSTITUTE PROCEEDINGS is invited to the new rules governing the Prize Essay contest for 1919 under the heading of Special Notice in this number. It is requested that authors who are writing or who contemplate writing essays submit them at their earliest convenience, as the Institute is in pressing need of articles for publication in the PROCEEDINGS.

Topics for Essays

The board of control invited the Chief of Naval Operations, Commanders-in-Chief of the U. S. fleets, Chiefs of Bureaus, Presidents of the U. S. Naval Institute and Naval War College, and the Superintendent of the U. S. Naval Academy to suggest topics for essays. The suggested topics received to date will be found opposite the Special Notice, and the list will be added to as the suggestions are received.

Membership

Since April, 28 regular and 6 associate members have joined the Institute. Total membership 4957.

Deaths:

Rear Admiral A. Ward, U. S. Navy.

Ensign L. B. Hoops, U. S. Navy.

Resignations: Two.

Address of Members

Several hundred copies of the PROCEEDINGS have been returned, because of the lack of proper address, *all members are urged to keep the Secretary and Treasurer informed of the address to which* PROCEEDINGS *are to be sent, and thus insure their receipt.*

This precaution is now of particular importance as notices of changes of stations are not now available for the use of the Institute's staff.

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer

of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Suggestions Invited

Members are invited to send to the Secretary comments, suggestions or criticisms on the make up of the PROCEEDINGS, and to submit topics for essays.

Notice

Whole Nos. 145, 146, 147, 149, 155, 166 and 179 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916, January, 1918) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

ANNAPOLIS, MD., July 8, 1918.

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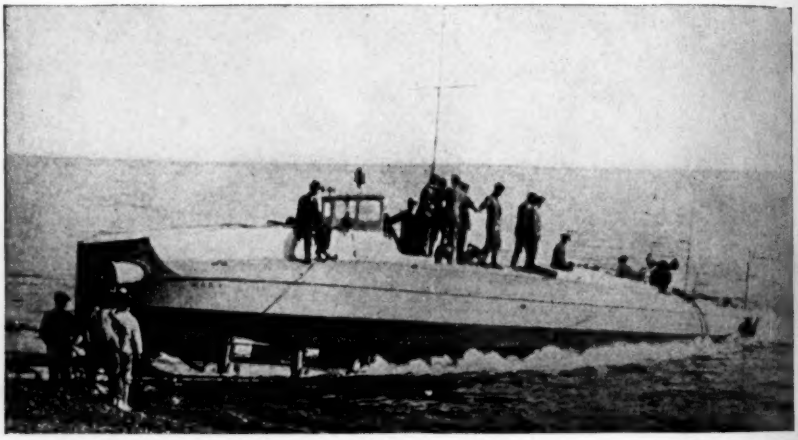

ONE OF THE TYPE OF TORPEDO MOTOR BOATS USED BY THE ITALIANS IN SINKING AUSTRIAN BATTLESHIPS.

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT W. B. JUBB, U. S. Navy

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BRAZIL

BRAZIL'S PART IN THE WAR.—The entry of Brazil into the war on the side of the Allies probably created but little enthusiasm in the minds of those at home. Those who consulted the map could see that it was a case of checkmating the schemes of Germany in a large maritime country, while on the other hand our food supply would be likely to benefit by our closer cooperation with Brazil. But that is not the sum total of Brazilian importance to us.

It is a remarkable fact that the man in the street knows practically nothing about this vast country, most of whose inhabitants have an admiration which amounts almost to a craze for everything English. In Brazil "the word of an Englishman" is the most reliable of sureties, and the shopkeeper cannot praise his goods more highly than by labelling them "English style." Tennis, association football, and rowing during recent years have gained enormous popularity, the actual English words for scoring, rules, and even applause being employed in the former two. It is amusing to hear the words, "Well played!" come in the midst of a salvo of Portuguese from the onlookers. The Boy Scout movement is thriving, and the educated woman of Brazil has already begun to see in first aid and nursing the thin wedge which shall open a way for her into the free and active life of her much-envied sisters.

It is worth our while to appreciate Brazil correctly, both as an ally in the war, and as an important commercial adherent after it. The vast wealth which is stored up in her little-explored hinterland is only beginning to be foreshadowed. The necessities of war have brought to light the fact that the production of manganese, mica, and other increasingly important minerals will very soon exceed altogether her present exports of rubber, coffee, sugar and cotton; cattle-raising is on the increase.

We at home know the years of war it has needed before we are even moderately sure of having scotched German influence in the United Kingdom. It is not to be expected therefore that the Teuton in Brazil has yet received the full measure of his dues. In a country of many illiterates, it is not possible to dispense in a moment with the services of 200,000 educated foreigners, and the important enterprises they represent. Furthermore, internments on such a large scale are a severe tax on the finances of a small nation. So that, although the German banks and great shipping houses are closed in Rio, yet Germans of both sexes are frequently to be met in public. But they conduct themselves discreetly. Even before Brazil declared war the German's life was not a happy one in Rio. To-day police protection is given to the windowless German buildings because the citizens broke in and attempted to burn them down in October, 1917, when two Brazilian (ex-German) ships were torpedoed on their way to Europe. They wrecked most of them very thoroughly then, and have since done the same to one or two lesser buildings. No doubt there are pro-Germans to be met with occasionally, but there is no mistaking the attitude of the vast majority. It is interesting, but a little risky, for an Englishman not well known in Rio to venture among the avenging crowds. The educated people of Brazil can almost all understand if not speak English, but the poorer folk, including the policemen, cannot distinguish it from German. However, to smoke one's pipe is to announce oneself an Englishman, and, as a last appeal, the singing of "Tipperary" would almost certainly convince any Brazilian crowd of one's nationality.

Rio de Janeiro, the most wonderfully reconstructed city in the world, was also, until recently, one of the most pleasure-loving. To-day the president is endeavoring to instill war economy into the nation before it feels the brunt of war—a by no means easy task. Economy is not easily preached in a country where state lotteries are of daily, and public holidays of all too frequent, occurrence. The most popular of the latter is the carnival, which occupies the four days preceding Ash Wednesday.

Brazilians who complain of the high cost of living will probably wish to see war economy continued in times of peace. It costs one about 30s. a day to live at all comfortably in Rio. Some manufactured articles are now difficult to obtain, and the cost of everything "owing to the war" and the colossal protective tariffs, is such as to make unaccustomed English folks feel faint with horror. A ready-made drill jacket, though cheaper in back streets, will be commonly priced at 45s. in shops on the Avenida Rio Branco. A tailor-made man's suit will cost about £10.

Recruiting posters have been common for over six months, and the result is seen in the numerous soldiers and khaki-clad "tiros" (*cf.* French "tireurs") who are to be seen everywhere to-day. These latter correspond to our territorials in principle, though in practice they have doubtless much to learn before they reach the splendid standard of our "terriers" of to-day. The first thing about them that strikes one is that they all wear elastic-side boots with very delicate leggings, a combination that would not survive the stress of life in Flanders for long. A recent message from the king to the president of the republic welcomed the navy of Brazil on its entry into active warfare. By no section of the nation is Britain so much beloved as by the navy. Nor is this surprising when one recollects that it was our own brilliant Lord Cochrane who founded Brazil's navy in 1823, receiving a marquisate for his services. His name and other British names are borne to-day by officers who trace their descent from Cochrane and his colleagues. During the revolt of 1893, when the navy was excluded from its country's ports, the British ships on the station took pity on them in their dire straits and gave them provisions. The descendants of those men are serving under the Republican flag to-day, but they do not forget the English kindness shown to their fathers.

In a young country the navy is of necessity hampered for lack of funds. It would be impossible for a small power to expend the vast sums which

are set aside by first-class powers, not for construction, but merely for upkeep and the constant succession of exercises vital to the efficiency of a fleet. Brazilian naval officers, until the entry of their country in the war, have had to content themselves with wearisome "make-believe" practices, and, worse still, the supply of materials for repairs and construction had been entirely commandeered by the belligerent powers. But there has always been a large section of keen officers and men to vitalize the fleet and keep in touch with modern naval lines of thought. A flourishing Navy League with a monthly organ shows that keenness on naval affairs is not confined to the service. When Admiral Alencar, the Minister of Marine, called for volunteers for active service, there was a rush for the lists on the part of officers and men alike. They have long chafed at inaction, and we may expect good service from them. Brazil will certainly do her bit on the sea.

Her air service was the first in the field. Some months ago half a dozen airmen, drawn from both army and navy, arrived in England, and more will follow.

Her entry into the war was as the unlocking of floodgates as far as the supply of materials for ship-repairing and even ship-building (a much harder proposition) were concerned. The magnificent harbor of Rio will now come into its own. Previously there was not enough material to work with; now the cry is for more skilled artisans to cope with the pressure of work. The dockyards have already done admirable work in repairing the damaged German ships. When these ships, some twenty in all, were taken over, the Germans had damaged their machinery and boilers to such an extent that it looked as if they would have to be renewed throughout. The enemy openly boasted, "What a German has torn to pieces it will take a German to put together again." Their boast has met its answer. If ever engineer had an extraordinary feat to perform it was the repair of those ships, yet they are under steam to-day. It would open the eyes of stay-at-home Britons to see what a number of large enterprises are either entirely or in part conducted by their fellow-countrymen. With the exception of submarines, Great Britain built the Brazilian Navy of to-day. Englishmen control her railways and mills, and huge power-stations; Englishmen represent great American firms; England provides overseers and charge-men for the yards and docks. If only people at home realized something of the promise of the country, Germany would stand but a poor chance of reasserting herself, as she certainly intends to do, in Brazil after the war.—*Land and Water*, 30/5.

CHILI

CHILIAN SUBMARINE UNIT ARRIVES IN ECUADORIAN PORT.—Six submarines, built in the United States for the Chilian government, arrived at the port of Ballenita, Ecuador. They left an Atlantic port in the United States on May 26.—*N. Y. Herald*, 18/6.

GERMANY

STRENGTH OF HUN NAVY A PROBLEM.—Allied and American naval officials are unable to form any accurate estimate of the present strength of the German battle fleets, according to Admiral Benson, chief of naval operations. Not only are reports as to what Germany has built or is building conflicting, but every effort to secure positive information in regard to the whereabouts and conditions of the Russian fleets in the Black and Baltic seas has met with failure.

Naval officials are particularly interested in the dreadnoughts and battle cruisers Germany may have secured by seizure of the Russian fleets. At least eight modern battleships were in the Baltic and Black seas and four battle cruisers were under construction at points in the Gulf of Finland when the Russian collapse came.

It is estimated that if Germany has obtained all Russian war craft and succeeded in putting them into fighting condition she has been able to increase the strength of her high-sea fleet by 25 per cent. Admiral Benson was quite positive, however, of the ability of the allied fleets to deal with the enemy should he venture out.

The chief of operations said that information as to the Russian Baltic fleet was unreliable in the extreme. He was particularly interested in the four battle cruisers which were scheduled for completion in the winter of 1917, but which undoubtedly were greatly delayed by the Russian collapse. The Germans are now in control of the ports where the ships were laid down. Some reports say these and other Russian craft have been taken over and fitted for action, while others declare many of the vessels which were in commission were destroyed by their crews to prevent their falling into German hands.

German Construction Considered.—Officials here are convinced that Germany has been building capital ships continuously since the outbreak of the war. They are unable to estimate, however, what number of additional heavy craft may have been commissioned.

In regard to submarine construction in Germany, Admiral Benson said there was no definite information here. Reports ranged, he said, from five a day to three a month. The admiral was not disposed to question, however, the recent statement of Sir Eric Geddes, first lord of the British Admiralty, that more submarines were being sunk than Germany could replace.—*Wash. Evening Star,* 12/7.

GERMAN CAPTURES IN BLACK SEA.—A correspondent of the *Cologne Gazette* states that "no great difficulty will be met with in restoring the Russian warships captured in Black Sea ports to formidable fighting units." The three Dreadnoughts, *Svobodnaya Rossia, Volia* and *Demokratia,* managed to escape, but it is to be feared that their surrender is only a matter of time. The ships already captured include the battleships *Evstafi* and *Zlatoust,* sister-vessels launched in 1906, displacing 13,000 tons with a speed of 16 knots, and an armament of four 12-inch, four 8-inch, and twelve 6-inch guns; the slightly smaller *Tavritcheski,* of equal speed, and armed with four 12-inch and sixteen 6-inch; the *Rotislav,* launched in 1896, of 9000 tons, 16 knots, and four 10-inch and eight 6-inch guns; and two older and probably ineffective ironclads. Apparently the four 30-knot light cruisers laid down at Nikolaieff in 1913-14 have never been completed, for no mention is made of them by the enemy. He has, however, seized the older cruisers *Otchakoff* and *Pamiat Merkuria*—ex-*Kagul*—which can steam 23 knots, and are armed with 6-inch batteries; together with the ex-Turkish cruiser *Medjidieh,* which was mined in 1915, near Odessa, raised by the Russians, and re-named *Prut.* Her speed is 22 knots, and she carries either 6-inch or new Russian 5.1-inch guns. The *Cologne Gazette* states that eight destroyers and several other torpedo craft were captured. In all the prizes the engines and boilers show traces of careless and unskilful management, and in some cases will have to be replaced. But it must be remembered that the Germans are now in possession of the Nikolaieff and Sebastopol dockyards, which are adequately equipped for repairing hulls and machinery.—*The Engineer,* 14/6.

GERMANS ONLY GET FOUR RUSSIAN WARSHIPS.—Only the dreadnought and three destroyers of the Russian Black Sea fleet were returned to Sebastopol in compliance with the German demand, the correspondent is reliably informed. The number of vessels blown up by their crews was much larger than those given over to the Germans.—*N. Y. Herald,* 2/7.

THE SUBMARINE CRUISER.—According to an expert naval writer, they displace about 2000 tons, are about 300 feet in length, have a speed on the surface of about 12 knots, and below the surface of about 10 knots, and are

armed with a 5.9-inch gun. In other words they are merely large submarines such as we ourselves have probably been building for some time past.—*The Engineer*, 7/6.

GERMAN SHIP LOSSES AND ADDITIONS SINCE 1917.—According to authentic German statistics just published, the German merchant navy, on January 1, 1914, counted 5,459,296 tons; through direct and indirect losses, German shipping concerns have during the war lost about 2,900,000 tons gross register, or more than 50 per cent of the total. If German vessels now lying in neutral ports are included in the losses, the losses then amount to about two-thirds the whole fleet. On the other hand, both the shipping companies and the yards have exerted themselves during the war to make up for these heavy losses by building new vessels, and in this connection the following particulars may be of interest: The Hamburg-American Company has in course of construction the *Bismarck*, 56,000 tons; the turbine vessel *Tirpitz*, 32,000 tons; and three more boats of 22,000 tons each, at Hamburg yards. In Bremen, nine steamers are being built, four of which have a carrying capacity of 18,000 tons each. The Flensburg yard is building three large passenger and cargo steamers, and two steamers each of 13,000 tons. The Tecklenborg yard, Geestemünde, is building two cargo steamers of 17,000 tons each, for the Panama Canal traffic. The Hamburg-South American Steamer Company is having built, besides the *Cap Polonio*, to replace the sunk *Cap Trafalgar* (18,000 tons) four additional cargo steamers at different yards. The North German Lloyd is building in Stettin two large fast boats, the *Columbus* and the *Hindenburg*, each of 35,000 tons, further, the *München* and the *Zeppelin*, each of 16,000 tons, and 12 more boats of 12,000 tons each. The Africa line has six, the Hansa Line 12, and the Kosmos Line 10 steamers in course of construction; their sizes varying from 9,000 to 13,000 tons. The aggregate of vessels which are being built for the large and medium-sized shipping concerns amounts to about 950,000 tons, which, however, will not by a long way make up for the losses experienced during the war, and this is why the state has lent a helping hand through the medium of the measure passed some months ago for the restoration of the German merchant navy.—*London Engineering*, 6/6.

GREAT BRITAIN

H. M. S. "EAGLE."—*Named by Mrs. Page at the Launch.*—The United States Naval Headquarters in London announce that Mrs. Page, wife of the American Ambassador, named H. M. S. *Eagle*, one of the largest ships in the British Navy, at her launch at Messrs. Armstrong, Whitworth, & Co.'s yard on the Tyne on Saturday. Mrs. Page was invited to be official sponsor for the *Eagle* by Sir Geddes, the First Lord of the Admiralty, with the express approval of the king.

The ensign of the Royal Navy and the stars and stripes flew side by side from jack-staffs on the ship's bow, and the smoothness and precision with which the vessel was put afloat augured well for her future. The Admiralty was represented by the Third Sea Lord, Rear Admiral Halsey, and representatives of the United States naval forces in Europe were present by direction of Vice-Admiral Sims, United States Force Commander. In reply to a speech made by the chairman of the board of directors of the company, Mrs. Page said that it was a privilege to her to name the *Eagle*, and she was deeply touched by the event.

Admiral Halsey commended the effective cooperation that has existed for over a year between the American naval forces in British waters and the British Navy. He emphasized the spirit of comradeship constantly shown between the rank and file of the British and American navies.

Eagle is one of the oldest ship-names in the British Navy. The first ship of the name dates back to 1650, but perhaps the most interesting was

the third. In 1776 she was lying at anchor off Governor's Island, near New York, when a member of the American Navy undertook to blow her up by means of a submarine boat—about the earliest mention of the submarine in action. The man went out in the boat and got near the *Eagle*, to which he intended to attach his torpedo. The torpedo, however, exploded too far from the ship to do any damage.—*London Times*, 13/6.

SPAIN

SPANISH NAVAL CONSTRUCTION.—For nearly a decade after the war with the United States, Spain made no serious effort to restore her shattered naval power. New construction was confined to a few small cruisers and torpedo craft, and although several proposals for building armored ships were made by the government, none of these plans ever came to anything. In 1906, however, the authorities approved a more ambitious programme, and in due course tenders were invited for the vessels the construction of which had been authorized. Three of them were to be battleships. According to the specifications they were to displace about 15,000 metric tons (14,763 gross tons), and to be equipped with turbine machinery and water-tube boilers, for a speed of 19 knots. Careful attention was given to protection, Spanish naval experts laying great emphasis on the importance of horizontal armor defence—the necessity for which, it may be observed, has been repeatedly demonstrated in the present war. The radius of action at economical speed was fixed at 5000 nautical miles. There was to be a main armament of eight 12-inch guns, having the widest possible arc of fire, in association with an auxiliary battery of twenty 4-inch quick-firers. Torpedo-tubes were to be dispensed with. Tenders for these ships were submitted by a combination of three British firms—Sir W. G. Armstrong, Whitworth & Co., Limited, Vickers, Sons and Maxim, Limited, and John Brown & Co., Limited—and by French and Italian firms. A prolonged study of the various designs by the Junta Superior and the Juntas de Estado Mayor of Naval Construction and Ordnance, resulted in the contract for the three battleships being placed with the British syndicate, which, owing to its Spanish connections, is known in that country as the Sociedad Española de Construccion Naval. The Spanish Minister of Marine justified his decision by stating that, in the opinion of his professional advisers, "the best battleship design, within the strict terms of the conditions of contract, is that submitted by the British syndicate, as it unites offensive and defensive qualities equal to those of the best ship-of-the-line hitherto built." The syndicate was also entrusted with the task of reorganizing the dockyards at Ferrol and Cartagena. At the first named port the plans involved the virtual creation of a new yard. The entire harbor had to be dredged out to accommodate ships of the deepest draft, a dry dock 600 feet in length was projected, and the new equipment was to include a 100-ton floating crane. Sir John Jackson Limited, cooperated with the syndicate as civil engineers. The Cartagena yard was also to be modernized, but the work there was on a more restricted scale. The inefficient condition into which the Spanish yards had been allowed to lapse is revealed by the fact that the *Princesa de Asturias*, an armored cruiser of 7550 tons, took no less than 15 years to complete for sea. Ferrol was selected as the yard at which the three battleships were to be built, while to Cartagena were assigned three destroyers (380 tons), 24 torpedo-boats (180 tons), and four gunboats. With regard to the torpedo craft, the British syndicate was directed to work in association with MM. Augustin Norman et Cie., of Havre, whose type of boiler was to be installed in all these craft. It was further stipulated that no more than 75 per cent of the executives and foremen at Ferrol and Cartagena were to be foreigners, the percentage being reduced to 50 per cent two years after the signing of the contract. As for the workmen, only 10 per cent of them were to be foreigners. Practically the whole of this programme was completed some time ago.

Thanks to the methods introduced by the British syndicate, a great reduction was effected in the building period for all classes of vessels. The *España*, first of the three battleships, was laid down at Ferrol in December, 1909, launched in February, 1912, and completed early in 1914. The second ship, *Alfonso XIII*, was begun in 1910 and completed in 1915. The *Jaime I*, last of the trio, was delayed by the difficulty of obtaining her guns from the foreign manufacturers, but she, too, is now in commission. In spite of their modest displacement, the three ships constitute a powerful division, able to bring a collective broadside fire of twenty-four 12-inch 50-caliber guns to bear. All of them exceeded 20 knots on their steam trials. Equally good progress was made with the torpedo flotilla, the three destroyers and 24 sea-going torpedo-boats all being delivered within the date prescribed by contract. Details of these vessels are subjoined.

Before the completion of this programme new proposals for expanding the navy were considered by the government. In 1914 it had practically been decided to order two further battleships, two cruisers, and six submarines, at an estimated cost of 15 million sterling, the expenditure to be spread over nine years. But mainly in consequence of the early submarine episodes of the war, this programme was shelved. In common with other powers, Spanish naval opinion was much impressed by the destruction of the *Aboukir*, *Cressy* and *Hogue* through submarine attack, and the result was to engender an exaggerated idea of the value of submersible torpedo craft. Under the influence of this affair, the Madrid government drastically revised the new programme, striking out the battleships altogether, and the new bill, as sanctioned on February 17, 1915, provided for four light cruisers (one of 5600 tons, similar to the British *Birmingham* class, and the other three of an improved *Arethusa* type), six destroyers (over 1000 tons), 28 submarines, three gunboats, and 18 armed coastguard and fishery protection vessels, capable of being employed in war time as mine-layers and sweepers. With the exception of the submarine and one light cruiser, all the foregoing vessels are now being built in Spanish yards. But for obvious reasons there has been great difficulty in obtaining the necessary material, and the completion of the programme will certainly be delayed. Of the submarines, most of which were ordered from foreign builders, a few have already been delivered. The first to arrive was the *Isaac Peral*, a "Holland" boat built in America by the Fore River Shipbuilding Company. This vessel crossed the Atlantic last year under her own power. Her displacement in surface trim is 500 tons, submerged 685 tons, and the length is variously stated to be 185 feet to 250 feet. The machinery for surface propulsion consists of two sets of Diesel engines—manufactured by the New London Shipbuilding and Engineering Company—each developing 600 horsepower, the total of 1200 horsepower producing a maximum speed of 15½ knots. The electric plant drives the boat at 10½ knots below water. The cruising radii are 3500 miles on the surface and 100 miles submerged. The armament comprises a 12-pounder gun on high-angle mounting, and four torpedo tubes, all in the bows. Further boats of this type were ordered in America, but the intervention of that country in the European War makes their delivery problematical. Three other submarines were ordered in Italy, the contract being placed with the Fiat-San Giorgio Company, at Muggiano, Spezia. These boats—of which we publish illustrations—have recently been delivered at Cartagena. Like the *Peral*, two of them are named after Spanish engineers who experimented in submarine navigation many years ago—*Narciso Monturiol* and *Cosmos Garcia*. In addition to these names, the boats bear the usual identification letters and are officially designated as: *Monturiol* (*A-1*), *Garcia* (*A-2*), and *A-3*. They represent the modern *Laurenti* type of coastal submarine, developed from the Italian *Argo* class. Boats of a very similar pattern have been constructed for Brazil (*F-1*, *3* and *5*), and Portugal (*Foca*, *Golfinho* and *Hidra*). The *Monturiol* and her sister-boats were launched in 1916. Their principal dimensions are as follows: Length, 149 feet 6 inches; breadth,

13.84 feet; draft, 10.24 feet; displacement on surface, 260 tons, submerged 382 tons. Engines: two sets of 350 horsepower 6-cylinder 2-cycle Fiat-Diesel motors, aggregating 700 horsepower for a speed of 13 knots maximum. For underwater propulsion there are two 250 horsepower electric motors = 500 horsepower for 8.5 knots maximum. The radius of action is: on surface, 650 miles at full speed, 1600 miles at 8 knots: below water, 18 miles at 8 knots, 85 miles at 4 knots. Each boat mounts two 8-inch bow torpedo tubes. The hull, of the well-known *Laurenti* type, is divided into eight water-tight compartments. The safety devices include three escape hatches, six lifting rings outside the hull, telephone buoy, and a detachable lead keel weighing 9½ tons. Submarine signalling and receiving sets of the Fessenden type, and a Marconi W/T installation are fitted. There are two periscopes of 3½ inch diameter. The diving depth of the *Monturiol* class is 130 feet.

A submarine depôt and salvage ship, named the *Canguru*, is being built for the Spanish Government at the Werf Conrad at Haarlem, Holland, the design being based on that of the German submarine tender *Vulkan*. The length is 303½ feet, breadth 65 feet, displacement 2100 tons. Machinery: Reciprocating engines of 1000 horsepower for a speed of 10 knots. The vessel is capable of raising 1000 to 1300 tons, and between the double hulls there is a docking space of 16½ feet.

At the present time the Spanish shipbuilding industry, in spite of the shortage of material, is undergoing remarkable development, and in addition to warship construction, a considerable number of merchant vessels is being built at Cadiz, Cartagena, and Bilbao. The strength of the Spanish Navy, including vessels under construction, is shown in the following table:

Battleships	Displacement Tons	Speed Knots	Maximum armor In.	Armament
España	15,700	20	10	8 12 inch
Alfonso XIII				20 4 inch
Jaime I				No tor. tubes
Pelayo *	9,890	15	16	2 12.6 inch
				2 11 inch
				9 5.5 inch
				3 tor. tubes
Cruisers				
Princesa de Asturias ...	7,550	18	12	2 9.4 inch
Cataluña				8 5.5 inch
				No tor. tubes
Reina Victoria Eugenia.	5,600	26	3	9 6 inch
B				2 tor. tubes
C				
D				
Reina Regente	5,900	19½	3¼	10 5.9 inch
Estramadura	2,130	19	1¼	8 4 inch
Rio de la Plata	1,950	19½	1¼	2 5.5 inch
				4 4.1 inch

Destroyers.—Six new, displacement over 1000 tons, also *Bustamente, Villamil, Cadarso,* 380 tons, 28 knots, two torpedo tubes; *Audaz, Osado, Prosperina, Terror,* 430 tons, 28-30 knots, two tubes.

Torpedo-Boats.—Nos. 1-42 (first 24 completed): 180 tons, 29-31 knots, three torpedo tubes.

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* Very old, and probably ineffective. There is also an old cruiser, *Emperador Carlos V,* used for harbor service and said to be dismantled.

Submarines.—Isaac Peral, displacement 500/685 tons, speeds 15½-10½ knots, one gun and four torpedo tubes; *Monturiol, Garcia, A-3,* displacement 260/382 tons; speeds 13 8.5 knots, two tubes.

Also 14 gunboats (seven modern), fishery cruisers, etc.—*The Engineer,* 31/5.

UNITED STATES

BUILDING

Two of the 40,000-ton battleships authorized by Congress will be constructed at the Brooklyn Navy Yard. Secretary Daniels, it is learned, has approved the building of ways at that yard for this purpose. The ships are included in the three-year building programme for the navy and represent the largest battle craft ever planned, exceeding any existing battleship by almost 10,000 tons. Under the plans as originally approved they are to carry twelve 16-inch guns each and will have a speed of 25 knots. Until now the huge capital ship programme has been held up by the urgent need for destroyers and merchant tonnage.—*Shipping,* 13/7.

FOURTEEN NEW DESTROYERS LAUNCHED IN U. S. YARDS.—The Navy Department was informed that all of the 14 destroyers scheduled to be launched on July 4 took their maiden plunge according to program.

The destroyers were launched as follows:

Bethlehem Union Plant, San Francisco: The *McKean, Harding, Gridley, Williams, Crane, Hart, Ingraham,* and *Burns.*

Newport News Shipbuilding & Dry Dock Co., Newport News, Va.: The *Thomas, Haraden,* and *Abbot.*

William Cramp & Sons Shipyard, Philadelphia, Pa.: The *Upshur* and *Elliot.*

Bethlehem Shipbuilding Co., Fore River plant, Quincy, Mass.: The *Maury.*

Immediately after the launchings from the Bethlehem Union Plant at San Francisco the keels of eight additional destroyers were laid to take their places.—*Official Bulletin,* 5/7.

REPORT ON SOUTHERN NAVY YARDS.—The commission on navy yards and naval stations, of which Rear Admiral J. M. Helm, U. S. Navy, is senior member, has made another of its reports on the subject of investigation, this time the yards and bases on the Atlantic coast south of Cape Hatteras. Following are the conclusions of the board:

After carefully weighing all the advantages and disadvantages, including costs, of the various sites between Cape Hatteras and Key West, Fla., the commission is of the opinion that, on this coast line, Charleston Harbor most nearly meets the physical requirements of the Navy Department for a first-class navy yard.

There is no evidence before the commission indicating the necessity of an additional navy yard between the aforementioned limits at the present time.

The commission has not found a site on the Gulf of Mexico that meets all the physical requirements of the Navy Department for a first-class navy yard. The principal difficulty is to combine a protected anchorage of sufficient depth and area for a fleet, easily accessible from the sea, with moderate currents, natural protection from sea attack and destructive hurricanes, and accessibility to centers of supplies and labor and material suitable for navy-yard use or for the maintenance of a fleet.

All the sites on the Gulf of Mexico are remote from the waters bordering on the Windward Islands and the region in the Caribbean Sea, where it is thought future naval hostilities are most likely to take place, and their

strategic value is believed to be lessened in proportion to their distance from such regions.

On the other hand, it seems quite possible that the fleet's communications with northern yards and resources might be interrupted, and in this event a base of supply, with ample docking and repair facilities, on the Gulf of Mexico might become of vital importance notwithstanding such distance.

After carefully considering costs of construction and maintenance and other advantages and disadvantages of all sites examined on the Gulf of Mexico, the commission is of the opinion that Pensacola Bay and the lower Mississippi River, in the vicinity of Algiers, most nearly meet the aforementioned physical requirements for supply, docking and repair, submarine and aviation bases.

From a study of strategic requirements, the commission is led to believe that the first line of special defence for the Gulf of Mexico should be in the Florida Straits and Yucatan Channel. An operating base will be necessary for submarines, destroyers, auxiliary vessels, and aircraft assigned to those localities. Key West seems to be the better located strategically for this purpose than any site available. It will be necessary to construct an artificial harbor for vessels based thereon as protection against hurricanes.—*Army and Navy Register*, 22/6.

THE DESTROYER "CRAVEN" LAUNCHED AT NORFOLK.—Seventy per cent complete, the destroyer *Craven* was launched at the Navy Yard here to-day. The vessel was christened by Mrs. Frank Learned, daughter of Captain T. A. M. Craven, Mobile Bay hero, for whom it was named.

The launching was the first here since the old battleship *Texas* was built, in 1892, and marks a revival of shipbuilding at the navy yard.—*N. Y. Herald*, 30/6.

DESTROYER "CASSIN," TORPEDOED LAST FALL, IS BACK IN SERVICE.—The American destroyer *Cassin*, which was torpedoed in European waters on October 16 last, has been repaired at a British yard and has been returned to station with the American forces, the Navy Department announced to-day.

The officers and crew of the *Cassin* won praise from British and American naval officers and were officially commended by Secretary Daniels.—*N. Y. Herald*, 2/7.

FORD INTERESTS TO BEGIN WORK ON GREAT SHIP PLANT.—*Government Approves Plan for Yards to Build Small Type Naval Vessels.*—Plans drawn up by Henry Ford for the construction at Kearny, N. J., of the largest shipbuilding plant of its kind in the world have been approved by authorities in Washington, and work will be started this week, it was announced yesterday by Mr. Ford's representative in Kearny.

Submarine chasers and patrol boats. in quantity production, will be turned out in this yard. The Ford plot is on the Passaic River, in the center of the shipbuilding interests of Kearny. It fronts on the Lincoln Highway.

The building on which work will begin at once, will cost $2,000,000. It will be of brick and steel, one story high, 1400 feet long and 400 feet wide. The Ford interests now are erecting a huge assembling plant, 960 feet long, to handle the output of the new factory.

Several thousand men will find employment as soon as the buildings are ready.—*N. Y. Herald*, 2/7.

PERSONNEL

GROWTH OF THE NAVY.—The strength of the navy is now 450,000, including marines and reserves, according to a statement issued by Secretary Daniels

on May 23. The latest recruiting figures received show the following in the various branches of the service:

	Enlisted Men	Officers	Total
Regular Navy	205,798	9,204	215,002
Naval Reserves	148,505	14,704	163,209
Marine Corps	48,505	1,364	49,869
National Naval Volunteers	15,000	785	15,785
Coast Guard	6,000	228	6,228
	423,808	26,285	450,093

—*Army and Navy Journal*, 29/6.

NAVY PROMOTION SELECTION.—The board of rear admirals for selection of officers of the line of the navy for promotion to the grades of rear admiral, captain, and commander, which usually convenes on July 1, will not meet this year until July 15, owing to delay in getting out the precept for the board. The board will be charged with selecting for permanent promotion 5 captains to rear admiral, 12 commanders to captain, and 26 lieutenant commanders to commander, and for temporary promotion 21 captains to rear admiral, 93 commanders to captain, and 219 lieutenant commanders to commander. The permanent promotions are on the basis of the increased number of permanent officers in the service since the last reapportionment of numbers in grades was made and the temporary promotions on the basis of the number of officers temporarily filling places in the lower grades allowed to the permanent force. The selection board will consist of Admiral Henry T. Mayo, Vice Admiral DeWitt Coffman, and Rear Admirals Nathaniel R. Usher, Albert C. Winterhalter, Augustus F. Fechteler, Thomas S. Rodgers, James H. Glennon, Harry S. Knapp, and Thomas Snowden, with Commander Reuben B. Coffey as recorder.—*Army and Navy Register*, 29/6.

NAVAL RESERVE

NAVAL RESERVE FORCE.—Numerous changes in the various branches of the Naval Reserve force were embodied in the recent naval appropriation act. Foremost of these was the passing of the national naval volunteers as a separate organization, being merged in Class 2 of the Reserve. At the request of the former members of the N. N. V., they will be permitted to wear their uniform insignia, which will become the distinctive marks for all members of Class 2 of the Reserve, which class will consist of officers and men who are fully qualified in their rank or rating for duty on board a combatant ship of the navy. There probably will be some slight distinctive marks or insignia adopted to distinguish the members of the various classes of the Naval Reserve force other than Class 2. Class 1 will probably be designated by the insignia of the regular navy; Class 3 will have an anchor (or propeller) in lieu of the star on the sleeve and shoulder mark; Class 4 will be the same as at present, except the star will not be worn, as that is to indicate line qualifications on a combatant ship; Class 5 will wear a miniature flying corps device in lieu of the star. Class 1 will continue to be composed exclusively of ex-service officers and men, the men having completed one enlistment and the officers having left the service creditably. Class 3 will comprise the Auxiliary Naval Reserve and Class 4 will consist of specialists, technical men, and female employees. The flying corps will comprise for service with the troops. Had the latter been the case and were the officer subsequently detailed to teach military science, it could hardly be contended that the continuity of his military service would have been broken, and from the military aspect of the case it does not appear to me that his military status would be changed were he now detailed from his present service for service with the army.

MERCHANT MARINE

NINETY-FIVE MERCHANT VESSELS ARE LAUNCHED BY AMERICAN YARDS.—The Shipping Board authorizes the following:

Counting in 2 ships which stuck on their ways, 11 which had been held up by a sudden freshet on the Columbia River and whose crews had stood by until midnight hoping the flood would subside in time to get the ships overboard on the Fourth, and the 8 which, through tidal or other causes had been launched on the eve of the Fourth, the big splash, from reports so far received, represents a total of 95 ships with an approximate deadweight tonnage of 474,464, as against the 430,886 tons as had originally been announced.

The list comprises 42 steel ships of 287,464 deadweight tons and 53 wooden vessels of 187,000 deadweight tons.

It was at 2 o'clock this (Friday) morning that District Superintendent L. C. Wentworth telegraphed to Vice-President Howard Coonley that the launching crews of the yards of the Columbia River had stood by until midnight and in readiness to launch 11 vessels which were ready for going down the ways but prevented by a sudden freshet. He asks that the 11 be included in the count of vessels launched, as only suddenly swollen waters had prevented the launching. After hearing the circumstances Mr. Coonley decided that these should be included.—*Official Bulletin*, 5/7.

OUR SHIP PRODUCTION INCREASING.—Statistics compiled by the Shipping Board for the week ending July 4 show that 14 requisitioned steel vessels, with a deadweight tonnage of 73,900, 5 contract steel steamships of 34,371 deadweight tons, and 4 wood ships agggregating 14,500 deadweight tons, had been completed and accepted during that period. This shows a total of 23 ships actually delivered during that week, with a combined total of 122,771 deadweight tons, an average of 3.8 ships a day for each working day of the week, with an average of 20,461.8 deadweight tons per day.

If the shipyards can maintain this pace throughout the 151 working days that remain of this year, counting from July 5, the output during those 151 working days will be 578.8 ships, with an aggregate tonnage of 3,089,736.8.

The number of new vessels already completed and delivered is 223, their aggregate tonnage being 1,415,022. Of this number, 218 vessels, of 1,384,428 tons, are in actual service.—*Nautical Gazette*, 7/7.

FLAG RAISED ON FIRST OF EIGHT SHIPS SEIZED BY URUGUAY.—Formerly a German vessel, whose German name was *Wiegand*, the *Artigas* is now flying the American flag. She is the first of eight German vessels seized by the government of Uruguay to join the American merchant marine. The *Artigas* is a vessel of 8800 deadweight tons. The other German vessels which will follow the *Artigas* will add a tonnage of 62,000 to the American merchant marine.

By agreement entered into with the Uruguayan government the Shipping Board will allocate all of these eight vessels or their equivalent in tonnage to trade with Uruguay. It is also agreed that the Shipping Board may subcharter four of the ships to the British Government.

Charles M. Schwab, Director General of the Emergency Fleet Corporation, to-day announced the creation of a requirement section for the corporation, with Mr. George M. Brill as its head. In creating this new section Mr. Schwab said:

"It will be the purpose of this section to keep in touch with the shipyards and learn from them in a general way the amount of materials, supplies and equipment required for extensions, so that a proper schedule may be placed before the War Industries Board for survey and if necessary for allocation. I think you will appreciate that during this time when the demand for many materials is so far in excess of the supply it is most essential that a clearing

house be provided, so that the needs of different government agencies may not conflict.

"The War Industries Board constitutes such a clearing house, and it is in my opinion a very essential instrument in the conduct of industry under present conditions."—*N. Y. Herald*, 14/7.

U. S. STOPS NEGOTIATIONS FOR INTERNED VESSELS.—Sudden increases in the price asked for the vessels, occasioned by the German advance in France, it is understood, have caused a discontinuance of negotiations by the War Trade Board for the acquisition of 64 German and Austrian ships interned in Chile and Argentina.

German residents in Chile are said to be persistently seeking to discourage their employers in Europe from considering a sale. The action of Peru in taking over German ships interned in her waters also had an effect on the plans of the United States.—*N. Y. Herald*, 16/6.

SHIPPING BOARD'S PLANS AND PROGRESS.—Ninety new troopships asked for by the War Department have been included in the enlarged building program of the Shipping Board, according to the Senate on June 24 on the Sundry Civil Appropriation bill, which was passed on that date. Ten new drydocks are to be built with the $25,000,000 which at the request of the Shipping Board was added by the Senate Appropriations Committee to the same bill. They will be located at Baltimore, Mobile, Savannah, Jacksonville, Beaumont, Galveston, New Orleans, New York, Los Angeles and San Francisco. The first million tons of new ships built on contract for the Shipping Board probably will be delivered before the end of June. In the week ending June 22 deliveries totaled five steel vessels, with a deadweight tonnage of 37,830, making the grand total of 1918 production 924,200 deadweight tons. Deliveries during the first three weeks of June have averaged one ship a day, with an aggregate carrying capacity of 125,992 tons. The first of 45 steel vessels to be built in Japan for the Shipping Board has arrived in this country and been placed in commission under the American flag. The ship is the *Eastern Sun*, a cargo carrier of 9036 deadweight tons. Of 23 steel vessels chartered from Japan by the Shipping Board 22 have been delivered on this side of the Pacific. They total approximately 145,000 tons.—*Army and Navy Journal*, 29/6.

Merchant vessels built in the United States in the fiscal year ended June 30, as officially returned to the Bureau of Navigation, numbered 1622 of 1,430,793 gross tons, giving America a merchant marine of about 10,000,000 gross tons. The output of the last four months, 706,084 gross tons, almost equalled that of the preceding eight months and is greater than any previous annual output in the nation's history.—*Shipping*, 13/7.

NEW DRY DOCKS.—The Shipping Board will build 10 new dry docks at Baltimore, Mobile, Savannah, Jacksonville, Beaumont, Galveston, New Orleans, Los Angeles, San Francisco and New York as soon as it has available the $25,000,000 which has been added to the pending Sundry Civil Appropriation Bill by the Senate Appropriation Committee. In the same measure, there is a proviso for 90 new troopships that the Shipping Board has included in its enlarged building program.—*Marine Journal*, 29/6.

WILL TRAIN MARINERS ON THE PACIFIC.—The U. S. *Iris*, formerly mothership of the Pacific torpedo flotilla, it is announced, will be placed in commission as a training ship for American merchant mariners on the 24th of this month. A six-weeks' course of training will be given and the ship can accommodate between 300 and 350 cadets at one time. Her headquarters will be at San Francisco.—*Marine Journal*, 22/6.

FOUR HUNDRED THOUSAND TONS FOR THE ALLIES IS SWEDISH AGREEMENT.—For some months past negotiations have been in progress in London between representatives of the Allied governments, including the United States, and representatives of the Swedish Government. These negotiations have now been completed, and an agreement between the Allies and Sweden has been signed and ratified by the Swedish Government.

Under this agreement provision is made for the Allies to secure the services of Swedish shipping to the extent of 400,000 tons dead weight. The agreement also provides for the granting of credits to the Allies in Sweden, and it regulates the export of Swedish iron ore as between the belligerent groups. The import of Swedish paper and pulp into this country under certain conditions is also arranged for.

The Allies, for their part, undertake to facilitate the importation into Sweden of stipulated quantities of foodstuffs and other commodities required for Sweden's trade and industries. These will be subject to control, and guarantees will be given against re-export either of the imported articles themselves or any of their products, or articles of similar character.

The Swedish Government has been represented throughout these negotiations by Count Wrangel, Swedish Minister in London, Mr. Marc Wallenberg, and Mr. G. Carlson.—*London Times*, 18/6.

OUTPUT OF NEW TONNAGE FOR JUNE.—Output of new tonnage for June constituted a record for American shipyards, amounting to 280,400 tons deadweight, of which steel ships accounted for 262,900 tons and wood ships for 17,500 tons. The following table of progress discloses how the first million tons of ships on the 1918 programme have been delivered (in tons deadweight):

January	88,507
February	123,625
March	172,611
April	160,286
May	259,241
June	280,400
Total 1918 production to date	1,084,670

In giving out the above figures, the Shipping Board stated the June output came within 15,000 tons of the world's record set by British shipyards in May, and which included all classes of vessels. But considering that once upon a time Great Britain produced more ships than all the rest of the world, an idea will be had of what it means for this country to have accomplished such a result as is set forth in the above figures. And even these will shortly be exceeded, so that at last the premier rank for shipbuilding will soon be held by the United States. This alone indicates the magnitude of the effort put forth by this country in order to win the war.—*Nauticus*, 6/7.

SIXTEEN HUNDRED AND TWENTY-TWO VESSELS ADDED TO U. S. MERCHANT MARINE.—With the addition of 1622 vessels of 1,430,793 gross tons, which were built in the United States during the fiscal year ended June 30, America's merchant marine now totals about 10,040,659 gross tons, comprising nearly 30,000 ships, according to the Bureau of Navigation.

The output of the last four months of 706,084 gross tons almost equaled that of the preceding eight months and is greater than any previous annual output in the nation's history. The year's output is almost double the largest output of German shipyards in peace times.—*Evening Star*, 4/7.

SHIP EVERY TWO DAYS TO BE HOG ISLAND RECORD BY AUTUMN.—The big fabricated steel shipbuilding plant of the American International Shipbuilding Corporation, at Hog Island, Pa., will launch its first ship, a 7500 ton

cargo vessel, Sunday, August 4, it was announced yesterday. Although the first keel at the Hog Island plant, which is the largest in the United States, was laid February 10, work has been delayed by an inadequate supply of steel, an officer of the corporation explained yesterday.

He added, however, that a plentiful supply now seemed assured, and that beginning in September Hog Island would deliver in ten and a half months the entire 180 vessels contracted for, which would mean turning them out at the rate of about one ship every two days.

The type of vessels being produced at Hog Island are distinctive in that all curved lines have been eliminated. The decks are flat, and a scheme of straight lines and right angles has been carried out in speed production. This scheme is said to be of advantage, especially in the transport model, of which 70 will be built at Hog Island, as the vessels will look the same at either end, making it difficult for an observer to tell whether it is coming or going.

In addition to a mile and a quarter of ways Hog Island is provided with seven big outfitting piers, each of which can handle four ships at a time. Before the summer is over it is expected more than 30,000 men will be employed in actual shipbuilding on Hog Island. The number now is in the neighborhood of 26,000, a large percentage being engaged in yard construction work.—*N. Y. Herald*, 9/7.

FIRST SHIP BUILT FOR U. S. IN JAPAN FLIES OLD GLORY.—Japan has contributed its first Japanese built steel vessel to the American Merchant Marine. This is one of 45 steel vessels which Japan has undertaken to construct in return for an allocation of steel.

The initial delivery from the Eastern Kingdom, which is now under the American flag, is the *Eastern Sun*, a cargo carrier of 9066 deadweight tons. She was built by the Kasawaki Dockyard Company, of Kobe, Japan.

The 45 vessels to be built in Japan for the United States are in addition to the 23 steel vessels chartered from Japan by the Shipping Board, of which number 22, totalling about 145,000 tons, have been delivered on this side of the Pacific.—*N. Y. Herald*, 25/6.

NEXT YEAR'S SHIP OUTPUT.—The danger of prophecy, as regards the possible output of tonnage, was exemplified last week by the action of the House Appropriations Committee, in cutting down the shipbuilding estimates by nearly one-half, or from $3,054,350,000 to $1,761,701,000 direct appropriations. Not that the hearings made public by the House Committee showed any intention on the part of Congress to limit the shipbuilding programme, but they cast doubt on the ability of the Shipping Board to carry through the programme planned by Director-General Charles M. Schwab, calling for the completion of 10,000,000 tons of new ships next year, let alone Chairman Hurley's promise of an output of over 13,000,000 tons. Up to date a little over one million tons has been built of the six million tons promised for the current year, and how much will be constructed in the next six months cannot be foretold with exactitude.

The House Committee discovered, upon examination of Chairman Hurley, that the original programme for the current year had been altered, and that the Emergency Fleet Corporation had actually contracted thus far for only seventy transports of 8,000 tons each and five troopships of 10,000 tons each, instead of the 150 large troopships planned. Vice-President Piez, of the Fleet Corporation, stated that the reduction of the troopship programme had been necessitated by the changing conditions, as the demand for tonnage has been most urgent. Notwithstanding this reduction in the programme, it was insisted that the Emergency Fleet Corporation had contracted for 1592 ships, with a total of 9,061,130 deadweight tons. Upon examination, however, it was found that these figures included 149 vessels noted as commitments, which are contracts substantially agreed to but not actually signed on April 30 last.

Mr. Schwab acknowledged before the House Committee that in his judgment the best the American shipyards could do next year, without extending present facilities, would be to complete between six and seven million tons of ships. This he deemed the maximum capacity at present, but declared that this capacity would have to be considerably increased in order to turn out even this tonnage and to comply with the military programme which had been submitted to the Board.—*Nautical Gazette*, 22/4.

U. S. ARMY

OVER ONE MILLION SOLDIERS ABROAD.—President Wilson announced on Tuesday that 1,019,115 American soldiers have sailed from American ports to participate in the war in France. The announcement is in the form of a letter from Secretary of War Baker to the President, which the latter has made public on the eve of the nation's national anniversary.

The President's statement, with the letter from Secretary Baker and his reply, follows:

"I have to-day received the following letter from the Secretary of War, which seems to me to contain information which will be so satisfactory to the country that its publication will be welcomed and will give additional zest to our national celebration of the Fourth of July:

"'War Department,
"'Washington, July 1, 1918.

"'My dear Mr. President: More than one million American soldiers have sailed from the ports of this country to participate in the war in France. In reporting this fact to you I feel that you will be interested in a few data showing the progress of our overseas military effort.

"'The first ship carrying military personnel sailed May 8, 1917, having on board base hospital No. 4 and members of the reserve nurse corps.

Record of Embarkations.

"'General Pershing and his staff sailed on May 20, 1917. The embarkations in the months from May, 1917, to and including June, 1918, are as follows:

"'1917—May, 1718; June, 12,261; July, 12,988; August, 18,323; September, 32,523; October, 38,259; November, 23,016; December, 48,840.

"'1918—January, 46,776; February, 48,027; March, 83,811; April, 117,212; May, 244,345; June, 276,372.

"'Marines, 14,644.

"'Aggregating 1,019,115.

"'The total number of troops returned from abroad, lost at sea, and casualties is 8165, and of these, by reason of the superbly efficient protection which the navy has given our transport system, only 291 have been lost at sea.

"'The supplies and equipment in France for all troops sent is, by our latest reports, adequate, and the output of our war industries in this country is showing marked improvement in practically all lines of necessary equipment and supply.

"'Respectfully, yours,
"Newton D. Baker.'

The President's Reply.

"To which I replied:

"'The White House,
"'Washington, D. C., July 2, 1918.

"'My dear Mr. Secretary: Your letter of July 1 contains a very significant piece of news and an equally significant report of the forwarding of troops during the past year to the other side of the water. It is a record which I think must cause universal satisfaction, because the heart of the country is unquestionably in this war, and the people of the United States

rejoice to see their force put faster and faster into the great struggle which is destined to redeem the world.

"'Cordially and sincerely, yours,

"'Woodrow Wilson.

"'Hon. Newton D. Baker, Secretary of War.'"

—*Army and Navy Register.*

ARMY OF 4,000,000 MEN IN SIGHT.—That the United States now has 2,500,000 soldiers under arms at the beginning of July and will have 4,000,000 men in the army before the end of the year was the statement made to the sub-committee of the House Committee on Appropriations by Brig. Gen. R. E. Wood, U. S. A., Acting Quartermaster-General, during the recent hearings on the Urgent Deficiency Bill. The report of these hearings made public on July 2 shows that while General Wood was submitting tables showing the supplies necessary for the Quartermaster Corps, Congressman Gillett remarked: "It appears we will have 4,000,000 men in uniform by January 1 next."

"Without revealing any military secrets," General Wood replied, "I know that we have 2,500,000 now." He declared that the plans of the War Department called for an increase of 1,500,000 men in the next six months.

General Wood then made this statement: "On February 28 the general staff gave General Goethals the military program which was supposed to go until June 30, 1919. That called for 100,000 men per month to be called during 1918. After the German drive began the call for April was increased to over 200,000 men; the call for May was increased to over 300,000, and last month without any notice the June call was increased to approximately 300,000. That meant that the net increase in three months was 80,000 men, less 300,000 or 500,000 additional men called to the colors with practically no notice at all, which was almost equal to the entire draft of last September.—*Army and Navy Journal*, 6/7.

AMERICAN BATTLEPLANES are now beginning to make their appearance on the Western front, and while no details are available at the present moment regarding the types in use, it is of interest to note the changes undergone by well-known types of domestic machines. Certain of our machines have taken on characteristics of German battleplanes, such as the tapered front, propeller pot, and fish-like fuselage, while others have taken on the characteristics of the French Spad and the British Sopwith fighter. The American machines in several instances are enclosing the V-shaped engines, leaving only the exhaust pipes showing, and these are grouped into one pipe on either side, which leads back and ends in a perforated taper. One well-known type of American airplane has been so materially changed of late that it is at first confounded with the French Spad: the engine is entirely enclosed; the wing arrangement is similar to the Spad; and the strut arrangement is identical to the French machine.—*Scientific American*, 29/6.

NEW ARMY PAY SYSTEM.—A suggestion coming from officers abroad may be adopted relative to the system of making payments to enlisted men. It is proposed to give a minimum amount to each soldier a month, being but a part of the money actually due. It has been suggested that this sum should be $7.50 and the payment be registered in some such manner as is done in the English Army, the soldiers carrying a small account book. It is further proposed that at regular intervals a complete settlement will be made, the government paying the soldier the balance due. There has been a suggestion that this settlement be quarterly and another suggestion that once a year would be often enough. Still another idea advanced is that the government allow the money to accumulate until the end of the soldier's service and then make final settlement with him. There has been considerable criticism concerning the delay in paying the soldiers, the statement having been made in the House on July 6 that some of our men

have been compelled to go months without any payment whatever. If the new scheme is adopted it would simplify the problems arising in connection with exact payments and reduce the volume of work put upon disbursing officers. It also will make effective the provision in the war risk insurance act authorizing the Secretary of War and the Secretary of the Navy to withhold a portion of the pay of a soldier or sailor to be held during such period of service as may be prescribed. This provision of law was adopted at the suggestion of General Pershing, who called the attention of the authorities in this country to the fact that the American soldiers had entirely too much money to spend abroad and anticipated difficulty in their intercourse with soldiers of the allied armies with whom we are fighting, who receive but a small percentage of the pay of our men.—*Army and Navy Register*, 13/7.

FIVE CENTRAL CAMPS NAMED FOR TRAINING CIVILIANS AND ENLISTED MEN FOR OFFICERS.—The War Department authorizes the following:

Five central officer's training camps, at which civilians and enlisted men will be trained for commissions in the Officer's Reserve Corps, have been established by the War Department. Camps for infantry training are located at Camp Lee, near Petersburg, Va.; Camp Gordon, near Atlanta, Ga.; Camp Pike, near Little Rock, Ark.; a camp for field artillery training at Camp Taylor, near Louisville, Ky.; and a camp for machine-gun training at Camp Hancock, near Augusta, Ga.

These training schools will be run continuously, a new class being admitted monthly. The course of training will be four months at the infantry and machine gun schools and about three months at the field artillery school. These schools are open to qualified enlisted men of all branches of the service, except coast artillery corps, signal corps, and labor units, and also to a limited number of civilians.

To be eligible for admission to a central training school, candidates, either civilians or enlisted men, must be between the ages of 20 years and 8 months and 40 years; must be citizens of the United States and not have been born in any of the countries with which the United States is at war or allies of such countries. Enlisted men must have the moral, educational, and physical qualifications required of an officer. Civilians must be graduates of a high school or have pursued an equivalent course of instruction; must be of good moral character; and must have the physical qualifications required for a commission in the Officers' Reserve Corps.—*Official Bulletin*, 6/9.

ORDNANCE AND GUNNERY

INTERNAL BALLISTICS.—On Friday, May 24, Lieut.-Colonel A. G. Hadcock delivered a lecture on "Internal Ballistics" at the Royal Institution. It has, he said, long been recognized that a gun is a single-stroke engine, and a very inefficient one at that. Although it is impossible to obtain by direct means an indicator diagram connecting the pressure in the gun with the corresponding position of the shot, it is possible to draw such a diagram if certain facts are known. A gun is, however, essentially an internal combustion engine, and many of the facts connected with it correspond much more nearly to a gas, oil or petrol engine than to a steam engine. Indeed, there are many analogies between a gun and an ordinary internal combustion engine. The processes which take place in a gas or oil engine are comparatively simple, the gas or fuel is introduced with the proper amount of air into the cylinder, compressed, and then exploded or burnt there at more or less constant pressure. The hot gases expand and the piston is forced along the cylinder.

The propellant which forms the charge for a gun always contains in itself the necessary ingredients to ensure complete combustion. The weight of explosive necessary to produce any given amount of energy is therefore considerably greater, since it also contains the oxygen necessary for com-

bustion, than the weight of gas or oil which would produce an exactly similar amount of energy when combined with the proper proportion of air. It is this fact which renders a gun an inefficient machine when it is compared with other internal combustion engines. The addition of air or oxygen is unnecessary, but since gunpowder, cordite and the kindred propellants will not begin to burn in a vacuum it is essential that atmospheric pressure should exist in the gun chamber. When the charge is ignited in a breech-loading gun a somewhat complicated series of operations occur which may be thus enumerated—the gun being supposed loaded:—

(1) The charge begins to burn at atmospheric pressure.

(2) The pressure rises and forces the copper driving band which surrounds the projectile to give rotation into the rifling grooves.

(3) The charge still burns and the pressure forces the shot along the gun.

(4) The charge is completely burnt.

(5) By the expansion of the hot powder gases the shell is forced further along the bore and out of the gun.

One of the most important of these processes is the forcing of the driving band into the rifling, and the subsequent behavior of the charge depends greatly on the initial resistance of the driving band to being forced into the grooves. The greater this resistance the larger will be the proportion of the charge burnt before the band is fully engraved and the higher will be the pressure when the band is fully engraved.

Most artillerists have, so far, treated the problem of internal ballistics either (*a*) as if the gun were a closed vessel for each position of the projectile, as in Centerval's and Marshal's methods, or (*b*) that the pressure for each position of the projectile bears some definite relationship to the pressure which would have been developed had the charge been burnt in a closed vessel of capacity equal to that of the chamber of the gun. This method of treatment has been adopted by Gossot, Heffernan, Charbonnier, and others.

Neither of these assumptions is correct, because in a closed vessel no linear motion is given to the charge, while in a gun a considerable amount of energy is absorbed by the charge having to be put into motion. Thus we find that the pressure on the breech of the gun is higher than that on the projectile. The pressure on the base of the shot is that due to putting the shot alone into motion, while the higher pressure on the breech is due to the additional work required to be done in putting also into motion the weight of the gas or charge. Direct experiment proves this to be the case, and usually the difference in pressure on the breech and on the base of the shot amounts to between one and two tons per square inch.

Another way of looking at this fact is to remember that when any fluid under pressure is put into motion a certain amount of the pressure is lost. The amount so lost depends on the velocity. In our case we have the gas under high pressure; part of it is in contact with the shot and moving at the same velocity as the shot; the remainder has a gradually less linear motion until at the breech end of the gun there is no relative motion. It follows then that the forward part of the gas which has a considerable velocity will have less pressure than that part in contact with the breech end of the gun.

In a gun the space behind the projectile continually increases as the projectile travels along the bore; thus each portion of the gas as generated may, for our purpose, be considered to expand and do work on the shot. In doing so it would lose heat, but, at the same time, the charge continues to burn and additional heat is given to the already generated gases, thus our hypothetical expansion is neither adiabatic nor is it isothermal. For simplicity we suppose that no heat is imparted to the walls of the bore; but any loss from this cause is accounted for in the factor of effect.

The investigation is hedged round with difficulties, and the assumptions made by the various artillerists who have given so much thought to the

subject still left something unaccounted for. A key to the more correct solution seemed to me to be by Clerk Maxwell's diagram of isothermal lines. In Maxwell's figure each isothermal line corresponds to the expansion of gas at some definite constant temperature. These curves give therefore the relationship between the pressure, volume and temperature, and knowing any two of these the third can be immediately determined.

If now, instead of temperature, we consider these curves to relate to some definite fraction of the charge which has been converted into gas, the gas expanding according to a definite law, as though no more of the charge would be burnt, but that the proper amount of additional heat from the unburnt part of the charge was imparted to the expanding gases, then a set of lines differing slightly in character from those in Maxwell's figure are developed. They are, in fact, lines of equal combustion, but for shortness, and in order to retain the Maxwell simile, I have called them isopyric lines. The trace of each isopyric line shows the expansion curve of the gas then generated, on the supposition that the remainder of the charge remained unburnt.

For each isopyric line, if the position of the shot in the gun is known—that is to say, if the volume is known—then the pressure can be at once determined, or if the pressure is known the position of the shot can be found.

Many people think that if the resistance between the shell and gun could be prevented a large amount of additional energy could be given to the projectile in the shape of extra velocity. But whilst frictional resistance certainly consumes a proportion of the energy given off by the powder it serves a most useful purpose, and enables the powder to burn and develop its power. Were it not for this resistance only small-sized powder could be used, and it would have to burn very much in the same way as that assumed by Robins, *i. e.*, that all the charge is burnt, and a high pressure obtained before the shot moves. The final muzzle velocity would subsequently be much restricted.

Although the resistance along the bore is important, it is not so important as the initial resistance of the driving band to being forced by the gas pressure into the rifling grooves and thereby being engraved. The band resistance varies inversely as the caliber of the gun, *i. e.*, the pressure per square inch on the base of the shot would be much higher in a 3-inch gun than in a 15-inch. It depends also on the width of the band and on its maximum diameter. As the form of these driving bands has been fixed more or less arbitrarily, and in many cases to meet individual ideas, they differ very considerably both as regards general form and their proportions, so that it is difficult to obtain a working formula to fit every case. It is therefore necessary to ascertain by statical means the resistance of each type of service band. This is done by making a short cylinder rifled in the bore at one end and slightly enlarged in the bore at the other. A plug representing the shot and fitted with a driving band of the exact shape is introduced. The cylinder is fitted with a steel screwed plug, and the base of the shot with a cup leather. Hydraulic pressure is then applied through a pipe screwed into the plug; and the diagram showing the pressure relative to the motion of the shot is engraved on a brass plate by means of a pressure indicator placed on top of the cylinder. The brass plate is moved by the shot. The actual static pressure required to force the band into the rifling begins at a very low pressure, and gradually increases until it reaches a maximum when about two-thirds of the length of the band has been forced into the grooves, and then diminishes until the pressure shows a nearly uniform reduction towards the muzzle. During the time the driving band is being engraved the charge is rapidly burning, and the gas pressure rises from atmospheric pressure to four, five, or six tons per square inch, and the velocity of the shot at the end of this short period may be considerable. The gas pressure is always much higher than the static hydraulic pressure necessary to engrave the band and it follows that a considerable

fraction of the charge is consumed while the shot is being put into motion and the band fully engraved.

After the whole of the charge has been burnt, ordinary adiabatic expansion takes place, so that, at the muzzle of the gun, the mean pressure is reduced to about 4.5 tons per square inch, and the shot leaves the gun with a velocity of about 2910 feet per second.—*The Engineer*, 7/6.

GUN EROSION.—In the suggestive and instructive paper read last March before the Institute of Naval Architects, Professor H. C. H. Carpenter explained how the working out of the iron-carbon equilibrium diagram had rationalized the whole question of the heat treatment of steel, rendering intelligible and coordinating numerous practical rules and recipes. These, in the absence of the definite guidance now furnished by the laboratory researches of many notable metallurgists, had been arrived at by following the apostolic precept of trying all things and holding fast to that which had proved good. It is indeed remarkable how much can be accomplished in this way, but the method, though effective, is slow and costly. In fact, the mathematical theory of probability affords some ground for the view that the advance made is in such cases proportional to the square root of the effort expended, in place of being directly proportional thereto, as should be the case in investigations carried out under the guidance of a definite and approximately accurate theory.

The problem of the erosion of guns affords a striking illustration of how a vast mass of observations may be accumulated as the result of careful observation and experiment, without leading to any clear view as to the real nature of the process, and affording but empirical rules for the minimizing of the mischief. The evil is one of very long standing. Probably it was not very serious in the case of the old smooth bores, but when the introduction of rifling showed artillerists what an instrument of precision a gun might be at its best, attention was soon attracted to the rapidity with which this pristine accuracy was lost as erosion proceeded. Many costly experiments were made without, however, really elucidating the true character of the phenomenon. The purely laboratory work of metallurgists, made without any direct reference to the subject of gun erosion, seems, however, to clear up many points, and should bring us appreciably nearer a final solution of the problem.

In a paper read last February before the American Institute of Mining Engineers, Professor H. M. Howe showed that many points connected with the erosion of guns were rendered intelligible by a consideration of the iron-carbon diagram. For example, it has long been known that the interior surface of a gun became hardened on firing, the effects being perceptible even after as few as five shots. This hardening, though detectable at first merely near the chamber end of the rifling, spreads forward as further rounds are fired. The thickness of the hardened layer in an old gun may be as little as 1/10,000 inch at the muzzle and 61 times as much at the end of the rifling. Professor Howe holds that this hardened layer is not due to carburization of the metal, but is merely a result of heat treatment. As difficulties in the theory that carburization is an effective cause, he notes that the products of combustion of modern propellants contain so large a proportion of carbon dioxide as almost to inhibit the carburizing properties of the monoxide present.

Moreover, the time available for action of this kind appears to be far too short. Thus the liner of a 14-inch gun which was studied by Professor Howe had been worn out by the firing of 170 rounds. The total effective working life of this liner was accordingly only some 3.4 seconds, a time which is far too short, in Professor Howe's opinion, for any effective hardening to be produced by the carbon-monoxide of the gases, diluted as these are by a large percentage of CO_2. Professor Howe accepts accordingly the view that the hardening is the result of heat treatment, and that the hardened layer, as suggested some years ago by Rosenhain and Belaiew, is steel in the state of martensite.

In its normal condition the steel of the liner is a mixture of ferrite and cementite or α iron.* If this mixture be heated above a certain temperature the two constituents merge into each other, and if the combination thus produced be then quenched a hard alloy, consisting generally of needle-like chrystals, is obtained. This is known as martensite. Professor Howe states that this is essentially what occurs to the inner face of a gun liner, but that owing to the peculiar conditions in which the transitions of the phases are effected, the needle-like crystallization generally obtained is suppressed; but that the material is martensite nevertheless.

A peculiarity of the treatment to which the face of a gun liner is exposed is that the heating is extraordinarily rapid and lasts for an extraordinarily short time. The surface for a depth of many molecules is raised above the melting point of the metal and a wave of heat starts outward. Wherever the temperature wave rises to a sufficient height, the ferrite and cementite of the α iron begin to merge and form austenite. Hardly, however, has the wave started on its progress outward when the temperature at the face of the liner falls and the layer which has absorbed the original pulse of heat is then rapidly cooled by conduction outwards. The further away any layer lies from the face of the bore the lower is the maximum temperature attained, and this maximum at a very short distance from the face falls below the limit at which the transition into austenite is possible. Moreover, even when the requisite temperature is attained the time during which this temperature remains above the transition point becomes briefer and briefer the greater the distance from the inner wall of the liner. As time is required to change ferrite and cementite into austenite the amount thus transformed in any one heat wave becomes smaller and smaller the further the metal is from the surface of the liner.

After the projectile has left the gun, the thin layer in which austenite has been formed cools again, and this cooling is accompanied by some reversion towards the α condition. This reversion of phase takes more time to effect than the change from α iron into tustenite, and some of the latter therefore remains untransformed and being rapidly chilled, is converted into martensite. On a second discharge of the gun additional austenite is formed, and in this way the thickness of the hardened layer progressively increases. Its total thickness is, however, limited by the fact that as already pointed out the temperature necessary for the formation of austenite is only attained within a very thin layer adjacent to the inner surface of the gun.

The net result of the treatment above set forth is that the tough alpha metal which constituted the original face of the liner is replaced by a hard, but brittle, layer of martensite. The temperature gradient in this layer is extremely steep, and the transformed metal is too brittle to accommodate itself to the consequent differential expansions. Cracks form accordingly. On the lands of the rifling these are in the main transverse cracks, the reason being, Professor Howe states, that these lands are free to expand in a direction tangential to the bore. The straining action is thus less tangentially than axially in which direction the metal is firmly backed up by the solid metal of the body of the liner. In the grooves the principal cracks are longitudinal, since here the metal is not free to expand in the tangential direction.

Whilst the process above described accounts qualitatively for the character of the cracking the great extent of the mischief is due, Professor Howe holds, to a secondary cause. As the copper driving band of the projectile passes over the cracks these latter are stretched open and their hardened edges bite off mouthfuls of copper which are entrapped in the cracks and prevent these closing when the stress is released, and during the subsequent cooling of the metal. The result is that the crack is

* See "The Iron-Carbon Equilibrium Diagram and its Practical Usefulness," *Engineering*, April 12, 1918, p. 394.

deepened or a fresh crack is formed. An examination of the worn-out liner already referred to showed the presence in the cracks of a relatively considerable quantity of copper.

Whilst the hardening, cracking and roughening of the bore can be accounted for on the above lines, something further is required to explain the actual loss of metal by which the bore is gradually enlarged. In Professor Howe's view this is due to the sweeping forward of the liquified or plastic molecules at the surface of the liner by the rush of the powder gases. A certain weight of metal is thus removed at each discharge.

With respect to remedies, Professor Howe expects but little from improvements in the metal used for the liners, though he suggests that possible benefit might accrue from the use of metal with a coarser structure than that now in favor. So far the resistance to erosion has been found to vary little over a wide range in the composition of the steel used. Some samples of gun steel cut from captured German guns show that the metal is of good quality, but contains no ingredients hitherto untried. One sample showed on analysis 0.372 C., 0.199 Si, 0.368 Mn, 0.017 P, 0.025 S, 2.870 Ni, 1.270 Cr. In another sample the proportions were 0.430 C, 0.229 Si, 0.218 Mn, 0.016 P, 0.045 S, 2.670 Ni, 0.136 Cu, 1.350 Cr, 0.040 Co. There is nothing here we may note to justify the claims made by Krupp in years past to having found a non-erodible metal. That the claim was only a bluff was proved before the war by the refusal of the firm to take a very large order for armaments on the basis that these claims should be justified. In this case when it came to actual business Krupp was not prepared to guarantee any longer life to his guns than his competitors were.

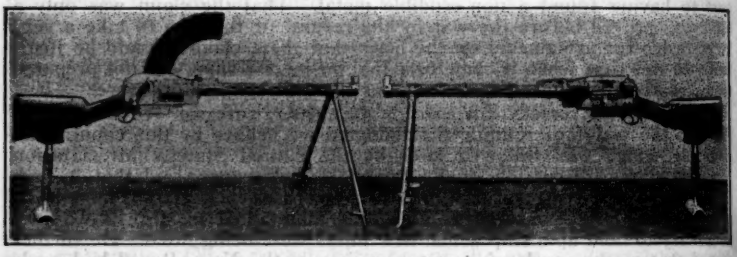
As a practical remedy for erosion troubles, Professor Howe pins his faith to the systef of relining first adopted we believe by this country, an example which was followed later by the United States. Mr. Hudson Maxim, on the discussion of Professor Howe's paper, said that it took three weeks and cost 17,286 dollars to reline a 14-inch gun. Since, however, a considerable reserve of guns was maintained in store it was not necessary to hold up a ship whilst new liners were being fitted. He further stated that as the result of recent experiments the Navy Board had made great progress in overcoming erosion troubles. Over 250 rounds had been fired from a 14-inch gun, and it was still accurate.

Other contributors to the discussion said that where smaller bores were concerned careful oiling increased the life of the weapon by some 85 per cent. Graphite blown in was said to be almost useless, but sperm oil carefully rubbed in had been found very effective. For weapons of rifle caliber the provision of a wad of cardboard at the base of the bullet was said by Mr. C. I. B. Henning, of the Du Pont Powder Company, to greatly reduce the erosion from cordite, and good results had, he said, followed the adoption of the same plan for field pieces.—*Engineering*, 7/6.

THE MADSEN GUN.—The Madsen gun is an automatic small-arm which depends for its action on the recoil of the barrel. It is shown with and without its magazine in Figs. 1 and 2 respectively, and it is the invention of a Dane. It has hitherto been made by the "Dansk Rekylriffle Syndikat," of Copenhagen, but its manufacture in this country is now being undertaken by a firm noted for the accuracy of its work in motor car engines—a quality which will be exceedingly useful in the present instance, for the Madsen gun comprises some intricate mechanism which calls for very high-class workmanship in its production. We have recently had an opportunity of carefully examining the gun at this firm's works, and in what follows we propose to give a description of it.

First of all it may be explained that the example which we saw weighed just over 20 pounds, and that there was no difficulty whatever in holding it to the shoulder for a time long enough to fire the contents of a magazine, but, as a matter of fact, the gun is self-contained with its own stand, which consists, first of all, of two legs *a*, Fig. 4, hinged to the underside of

the fore part of the barrel casing *d* in such a way that, when the gun has to be carried, they can be folded up close and parallel to the casing, so that they do not get in the way, as shown in the lowest view in Fig. 3. When it is desired to fire the gun these legs are hinged out away from the casing so as to form an inverted V—see Figs. 1 and 2 and the top view in Fig 4. The stock is pierced some 6 inches from its toe with a hole for the reception of a tubular post, the bottom of which has a cross-piece to form a foot, and this constitutes a third leg for the gun, the height of which can be adjusted by means of a screwed sleeve. The extremities of the two front legs, which are remote from the hinges, are furnished with points *b*, so that when extended they get a grip of the ground. When these arrangements are made the height of the gun from the ground is about right for use by a man lying down. In order that it may be possible to fire the gun either from the sitting or kneeling position, or if for any other reason it is desired to elevate the muzzle of the gun to a greater extent than is possible by simply hinging out the legs, the latter are made telescopic, and the length may be practically doubled by unscrewing the foot a few turns, which enables an internal rod, to which the foot is attached, to be pulled out. This is done till a spring stop-catch which forms a part



FIGS. 1 AND 2.—Madsen Automatic Gun, With and Without its Magazine.

of the rod, and which acts exactly as does the stop which holds an umbrella open, is uncovered and on being forced outwards by the action of its spring engages with the rim of the casing in which the rod slides and prevents the latter from being pushed back when it comes into contact with the ground. The arrangement used to connect the legs to the barrel case is in the nature of a universal joint, so that the gun can be moved from side to side and up and down or revolved round the axis of the barrel, within certain limits. Hence the aim may be altered without shifting the legs. It will have been gathered from the foregoing that the gun, the overall length of which is about 44 inches, is a handy weapon, which, as far as transport and aiming are concerned, is easy to manipulate.

We can now turn to technical details. The barrel *c*, which is some 23 inches long, including the chamber, is slightly greater in outside diameter at the breech end than at the muzzle. At both ends there is a length of some 3 inches where the metal is turned parallel, the intervening portion being given a gradual taper and having a number of rectangular channels machined in it for radiation purposes. The front end slides backwards and forwards in a bearing in what, for the want of a better term, we have called the barrel casing. The rear end of the sliding mechanism is carried by two projecting strips or feathers, which are free to slide in slots cut in the side of the casing. The whole of the sliding parts is thus only carried in three bearings, which reduces to a minimum the risk of bending even in the event of the casing being damaged.

The barrel casing is a cylindrical tube of metal which surrounds the barrel from end to end, and saving at the bearing we have just mentioned,

is some ½ inch away from it. This casing is perforated with numerous round-ended slots, some ½ inch wide and a few inches long, the axes of which are arranged parallel to the axis of the barrel, and which are

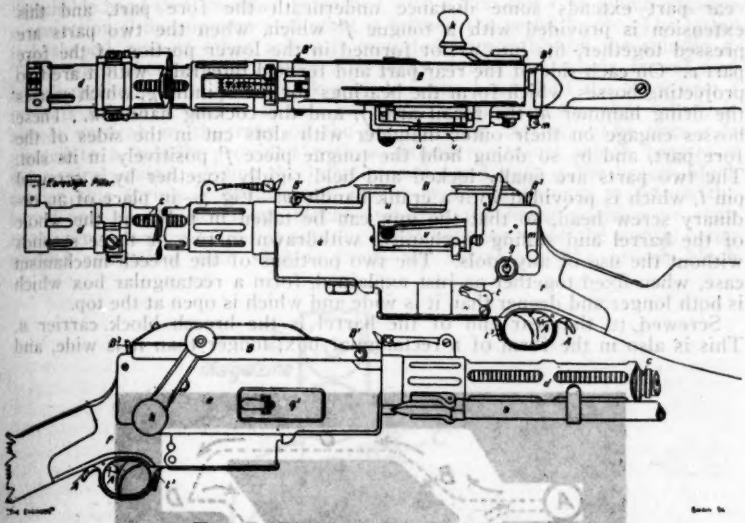


FIG. 3.—Plan and Side Elevations.

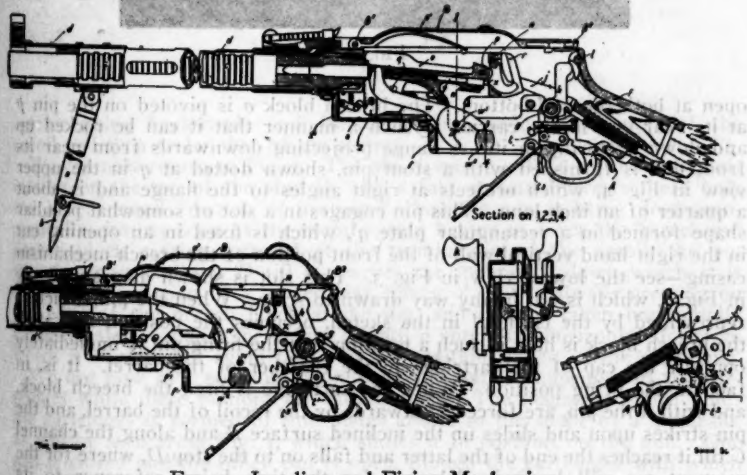


FIG. 4.—Loading and Firing Mechanism.

pierced at intervals round the circumference of the casing and along its length. The effect is to form an open-work cylinder round the barrel, the openings permitting of the radiation of the heat from the barrel to the atmosphere. The fore sight and back sight are fixed on the barrel casing and not on the barrel.

The breech mechanism casing is formed in two parts, a fore part *e* and a back part *f f*. The fore part is screwed on to the rear end of the barrel casing and the rear part is attached to the stock. The two portions are fastened together in the following manner:—The lower portion of the rear part extends some distance underneath the fore part, and this extension is provided with a tongue f^1 which, when the two parts are pressed together, fits into a slot formed in the lower portion of the fore part *e*. On each side of the rear part and formed integrally with it are two projecting bosses, which form the bearings for the spindle *g*, which carries the firing hammer *h*, the recoil arm *j*, and the cocking handle *k*. These bosses engage on their outer diameter with slots cut in the sides of the fore part, and by so doing hold the tongue piece f^1 positively in its slot. The two parts are finally locked and held rigidly together by a screwed pin *l*, which is provided with a crank handle *m*—Fig. 3—in place of an ordinary screw head, so that the gun can be taken in half and the whole of the barrel and sliding mechanism withdrawn in two or three seconds without the use of any tools. The two portions of the breech mechanism case, when fixed together as just explained, form a rectangular box which is both longer and deeper than it is wide and which is open at the top.

Screwed to the rear end of the barrel is the breech block carrier *n*. This is also in the form of a rectangular box, longer than it is wide, and

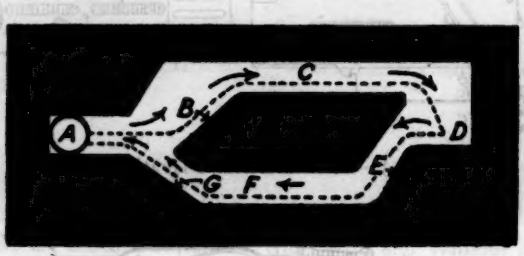


FIG. 5.

open at both top and bottom. The breech block *o* is pivoted on the pin *p* at its rear end in the carrier in such a manner that it can be rocked up and down vertically in it. A flange projecting downwards from near its front end is furnished with a stout pin, shown dotted at *q* in the upper view in Fig. 4, which projects at right angles to the flange and is about a quarter of an inch long. This pin engages in a slot of somewhat peculiar shape formed in a rectangular plate q^1, which is fixed in an opening cut in the right-hand vertical wall of the front portion of the breech mechanism casing—see the lowest view in Fig. 3. This slot is shown diagramatically in Fig. 5, which is not in any way drawn to scale. When the pin, which is represented by the circle *A* in the sketch, occupies the position indicated, the breech block is held in such a position that the firing-pin is immediately opposite the cap of the cartridge in the chamber of the barrel. It is, in fact, in the firing position. When the cartridge is fired the breech block, and with it the pin, are forced backwards by the recoil of the barrel, and the pin strikes upon and slides up the inclined surface *B* and along the channel *C* till it reaches the end of the latter and falls on to the stop *D*, where for the moment we will leave it, delaying for the time being reference to its further motions. It will be evident that, as the pin forms an integral part of the breech block, the latter must follow the movement of the former. Hence, when the recoil begins the breech block first of all travels backwards in a horizontal line for a short distance and is then lifted upwards. The effect is to raise it clear of the rear end of the cartridge, so that the

extractor can come into play. Before referring to the action of the latter, however, let us endeavor to explain the working of the remainder of the breech mechanism.

On the outside of the breech block carrier *n* at its rear end is fitted a detachable hard steel member furnished with a cam slot *r*, in which engages a projection j^1 on one arm *j* of what is termed the recoil lever. The latter is L shaped, and its other arm *s* is mounted immovably on the spindle *g*. Thus, when the cocking handle *k* is drawn back the whole barrel and breech mechanism is drawn back with it. The head j^1 of the lever arm *j* projects sideways, and it is this part that engages in the slot, which is almost vertical, in the rear of the breech-block carrier. The arm *s* is pivoted to a spindle provided with a shoulder, against which presses a stout spiral spring. When the barrel recoils, and with it the breech-block carrier, this spring is compressed, and it is strong enough to return the barrel and all the accessory mechanism into the firing position as soon as the recoil is over. This is actually what happens when the gun is being worked and when each shot is fired—the barrel and the breech block

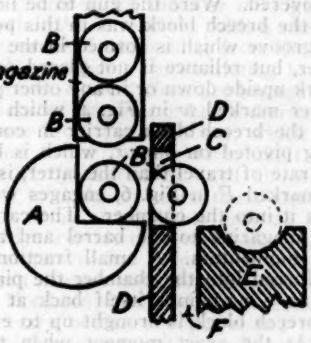


FIG. 6.

carrier going backwards and forwards, first under the action of the recoil and then under that of the spring.

We can now return to Fig. 5. The pin *A* was, it will be remembered, left resting on the top of the stop D. As a fact, it actually rests there only for a very small fraction of a second when the gun is being fired automatically, for, as soon as the recoil spring begins to force the barrel and breech block carrier forward at the termination of the recoil, the pin travels along the stop *D* till it reaches the incline *E*, down which it is forced by the action of a hinged leaf spring o^1 that is always pressing on the edge of the breech block at the top, and is then taken horizontally along the slot *F* and up the incline *G* until it enters the horizontal slot from which it started and again takes up the position shown in the engraving.

We are now in a position to understand what is happening to the cartridges while these motions are taking place. The magazine which holds the cartridges is formed of thin plates and is in the shape of a quadrant, as will be seen from Fig. 1, which shows it in position on the gun. One end is closed and the other end is open, though the cartridges with which it is filled are prevented from escaping by the action of a spring detent, which is only disengaged when the magazine is properly fixed in position on the gun. The place where it is fixed is on the top of the left-hand wall of the forward part of what we have termed the breech mechanism casing. In order to receive it there is formed in the wall of the casing a rectangular box-shaped receptacle *u*, Fig. 3, which is large enough to receive one

cartridge. The magazine is clipped in position with its orifice immediately over the top of this receptacle into which when the magazine is in place a cartridge is forced by the action of a spring, inside the magazine, that is put into compression as the cartridges are filled into it when the magazine is being charged. When the magazine is in position the axis of the cartridge which is first to be fired is parallel to the axis of the barrel and hence also to the side of the breech mechanism case and its bullet is pointing towards the barrel. The bottom of the receptacle or receiver is formed by an oscillating member *v*, into a channel in which the cartridge is forced by the action of the spring in the magazine. This member, which is just the length of a cartridge and has its axis parallel to it, is formed with a channel, as shown diagrammatically at *A* in Fig. 6. It oscillates backwards and forwards on its axis like a watch escapement wheel, and as it does so forces the cartridge *B* through a slot *C* in the side of the breech mechanism case *D* on to the breech block *E*. The latter at this moment has had its front end lowered, since the pin *A* on its underside has been forced down into the slot *F*—see Fig 5. Its front end, therefore, has been lowered so that the orifice of the chamber in the rear of the barrel has been uncovered. Were the gun to be held horizontally the cartridge would, when the breech block was in this position, have a tendency to travel down the groove which is formed in the top of the breech block towards the chamber, but reliance is not placed on the action of gravity, and the gun will work upside down or in any other position. What happens is that a special lever marked *w* in Fig. 4, which is operated by the forward movement of the breech block carrier in conjunction with the stop w^2, but which, being pivoted on pin w^1, which is below the breech block, has a much quicker rate of travel than the latter, is made to come forward along the passage marked *F* in Fig. 6, engages with the rear end of the cartridge and forces it into the chamber. The cartridge is thus positively conveyed from the magazine to the barrel and at no moment is it dependent on its own momentum. A small fraction of a second after the cartridge has been forced into the chamber the pin *A*—see Fig. 5—begins to rise up the incline *G* and finds itself back at its starting point, with the result that the breech block is brought up to exactly opposite the rear of the cartridge. At the exact moment when this occurs the striking hammer is released and, under the action of its spring, comes forward, strikes an anvil *x* which abuts against the end of a spring-controlled firing-pin *y*, which runs from end to end of the breech block—see Fig. 4. The result is, of course, that the cartridge is exploded, and the barrel with the breech block carrier and other mechanisms are forced backwards.

When this occurs the forward end of the breech block is raised so as to be free of the end of the cartridge by the action of the pin *A*—Fig. 5—running up the incline *B*. The extractor mechanism then comes into play. This consists of two pivoted members *z* and z^3, which are in contact with one another and act in unison. They are both pivoted at the lower part of the forward end of the breech-block carrier, and when not in operation the extractor proper is held down out of the way so as not to prevent the insertion of the cartridge into the barrel. When, however, the barrel begins to travel backwards the extractor *z*, which is arranged vertically beneath the rear end of the cartridge, is forced upwards, because its lower end encounters and runs up an incline formed at the bottom of the forward portion of breech mechanism casing, the upward motion being possible by reason of the fact that the pivot hole in the extractor is slotted. The effect of the upward motion is to cause a notch in the top of the extractor to engage with the rim of the cartridge in the chamber. Immediately this has happened the lower end of the other portion of the extractor mechanism, which is marked z^1, engages with another incline, and when this occurs a projection on it acts on the extractor in such a way that the cartridge is forced out of the chamber—this being possible since, as will be remembered, the breech block has previously been raised—and is made to strike against a curved groove formed in a quadrant-shaped projection

in the underside of the breech block *o*, so that it is expelled from the breech mechanism casing through a rectangular hole in the bottom of the latter. This hole is ordinarily closed by a hinged trap door, and we may here explain that even if the operator has forgotten to open this door before beginning to fire, it is opened automatically as soon as firing commences. In the lower left-hand view of Fig. 4 the cartridge case is represented as just having been forced out of the breech chamber, and with its rear end striking against the curved quadrant on the underside of the breech block.

The backward motion of the breech block casing has various other effects. It brings about, for instance, the return of the lever *w*, which has forced into the chamber the cartridge just exploded, so that it may be ready to come forward and force another one in. Then, too, the motion, of course, compresses the recoil spring, thus storing up energy for firing the next shot, and it also compresses the firing lever spring and cocks the mechanism.

We must revert for one moment to the magazine and to the cartridge-feeding mechanism. It will be remembered—see Fig. 6—that, in order to feed a cartridge into the chamber, the member *v*—Figs. 3 and 4—oscillates through the arc of a circle. As it revolves with a cartridge in its groove further cartridges are prevented from issuing from the magazine by reason of the curved shape of the member. On oscillating backwards, however—and both forward and backward oscillations are brought about by and work in concert with the motions of the breech-block carrier—another cartridge is received into the groove from the magazine, which cartridge is, at the next oscillation, forced on to the breech block and from thence into the chamber, and the series of operations outlined above is repeated. Each magazine is constructed to hold 25 cartridges, but when the gun is working automatically or firing single shots only 24 are fired from each magazine, the last cartridge remaining unfired until another magazine is put into place. This arrangement has been made so as to render unnecessary the cocking of the gun as each successive magazine is fixed. It is only when the last cartridge has been fired and none remains in the gun that re-cocking becomes necessary before another round can be fired, and to fire the last cartridge special movements have to be made.

To describe in such a manner that they may all be understood the actions of the recoil lever, the firing lever, and the trigger is, even with the aid of the drawings which we are enabled to reproduce, an impossibility. All that we can do is to give a general indication of what happens when certain things are done. To begin with, then, the gun can be made either to fire single shots like an ordinary rifle or it can fire automatically, when, with one man to manipulate the mechanism and to aim and another to remove the empty and clip on full magazines, as many as from 300 to 400 rounds per minute can be fired. One man unassisted can, we understand, fire up to 300 rounds per minute, including the changing of the magazines. When firing single shots the mechanism is comparatively simple, the striking hammer, which has been mentioned above, being released very much in the customary manner, so that it strikes on the anvil abutting on the rear end of the spring-controlled firing pin in the breech block. When it is desired to fire the gun in this manner a stop *A* is advanced towards the rear of the trigger so as to prevent the latter from being pressed back beyond a certain point. If, however, the gun has to be fired automatically this stop is withdrawn so that the trigger can be pressed back to the full extent of its travel. The effect of this is to disengage the single-shot firing mechanism entirely and to bring into play another set of mechanism, which is actuated by members working in connection with the forward arm of the recoil lever. In neither case can the firing hammer be released until the barrel has been pressed forward into the extreme position, or, in other words, until the pin *q*, which, it will be remembered, forms an integral part of the breech block and works in a

specially formed slot, has brought the block into the firing position. The actual releasing of the sear from the tumbler of the firing lever is brought about, when the gun is working automatically, by the passage of a cam, actuated by the recoil lever, over the top of a member working in connection with the sear, and this does not occur until the recoil lever has reached the extreme forward point of its travel.

The gun is provided with two safety devices. One of these, *t*—Fig. 3—is arranged on the left-hand side of the breech casing and is provided with a small handle by which it can be rotated through a small angle, with the result that a catch on it, *t* —see the drawing in the right-hand bottom corner of Fig. 4—prevents the sear, t^1, from liberating the hammer *h*, no matter how hard the trigger may be pulled.

In the event of a damaged or distorted cartridge causing the mechanism to jamb during its forward or charging stroke, when the gun is being fired automatically, the procedure in order to free it would be to open the door or lid *B*, which forms the top of the breech mechanism casing, and either to remove the cartridge or to assist it on its way to the barrel. As soon as the jamb is cleared the barrel will, of course, unless something be done to prevent it, continue to advance, under the action of the recoil spring, and on the completion of the forward stroke the cartridge will be automatically fired. So that this may not happen another safety lever, t^2, has been provided. As soon as the jamb occurs this lever is pressed, and its effect is to liberate the trigger mechanism from its cocked position, into which it has been put by the previous recoil, with the result that, although the barrel and its accessories are advanced to the furthest forward position, the hammer is not liberated and the shot is not fired. In fact the gun must again be cocked before firing can proceed. The cocking is, as will have been gathered, brought about by the handle *k*, which is provided with a hand knob. This handle or lever is on the right-hand side of the breech casing and it acts upon the spindle *g*, to which, it will be remembered, is fixed one arm of the cocking lever. The revolution of the handle *k* through a quarter of a circle in an anti-clockwise direction causes the barrel, with the breech block, etc., to be drawn back to the fullest extent, thus compressing the recoil lever spring and the firing lever spring and cocking the firing mechanism. This backward or cocked position is the normal condition of affairs. When single shots are being fired the effect of each explosion is to bring the barrel and the other mechanism back to the furthest extent and hold them there until the trigger is again pressed, and it is the same when automatic firing is in progress at the completion of the discharge of a magazine full. It is only when the last shot has been fired and the trigger again pulled that the mechanism is forced forward into the advanced position, where it remains, since there is no further explosion to push it back again. The cocking lever does not, of course, rock backwards and forwards as the shots are fired. It may, in fact, when the rearward motion of cocking has been performed, be again pushed forward into its original position, in which it stands vertically and in which it is held by the action of a catch.

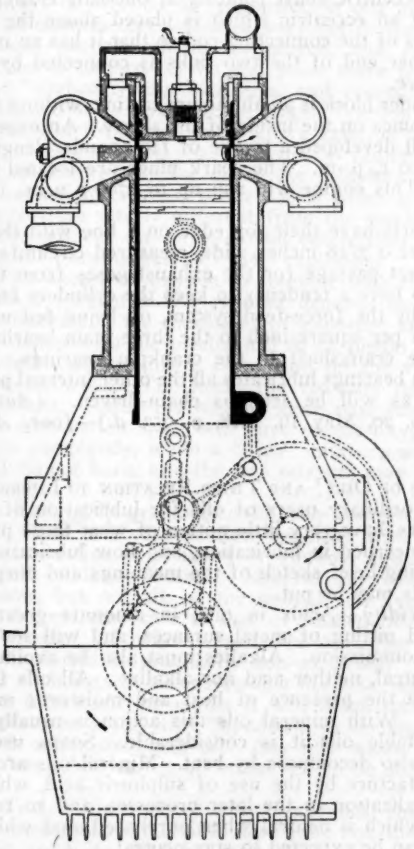
We explained with regard to the breech mechanism casing that it was practically an oblong box which was opened at the top. As a matter of fact, it is actually closed by means of a tight-fitting steel lid *B*, which is hinged to the forward end of the casing at B^1 and is held closed by means of a spring detent B^2, which embraces a catch on the top of the rear portion of the casing. This lid must be kept closed while the gun is being fired, for, hinged to its hinge pin and kept down by it in its normal position, is the leaf spring o^1, which presses, as explained above, on the top of the breech block and tends to cause the latter to hinge downward on its pivot.

It may be remarked in conclusion that, whereas, of course, the channels machined on the outside of the barrel do not afford sufficient surface for the entire radiation to the atmosphere of the heat generated when numbers of shots are fired in rapid succession, yet they do dissipate a good deal of heat, and then, too, the barrel and its breech-block carrier can be

readily and quickly removed and replaced by another in about 20 seconds, so that, with two barrels the gun can be fired practically continuously, the hot barrel having time to cool while the other is being used.—*The Engineer*, 6/7.

ENGINEERING

SINGLE-SLEEVE-VALVE MOTOR.—A new sleeve-valve engine is being developed by the S. S. V. Motor Company, of Pittsburgh, Pa., the design being



SINGLE-SLEEVE-VALVE MOTOR.

due to Charles B. and James M. Gearing. A cross-sectional view of the engine is shown in figure above.

The engine has four cylinders of 3½-inch bore and 5-inch stroke, and a single sleeve is interposed between each piston and its cylinder wall. The sleeve, of course, reciprocates at one-half the speed of the piston, making one reciprocation during each complete engine cycle. Its travel is equal to $\frac{13}{16}$ inches. This makes a total travel of 1⅝ inches during a complete cycle, as compared with 20 inches of piston travel. The sleeve is said to have a dwell corresponding to 275 degrees, during which period

the compression and power strokes take place. The ports in the cylinder wall and in the inner head are so arranged that the port in the sleeve is between the inlet and exhaust ports during this particular period.

When the crankshaft is 45 degrees from the bottom dead center on the power stroke, the sleeve moves up and begins to open the exhaust port. The latter closes at the top dead center. The inlet port is opened by a quick motion of the sleeve valve.

There are two inlet and two exhaust ports to each cylinder. The sleeve is positively operated by a double toggle combination, one link of which is driven by an eccentric shaft rotating at one-half crankshaft speed and the other half by an eccentric which is placed above the crankshaft and operated by means of the connecting rod so that it has an irregular angular motion. The upper end of the two links is connected by a third link to a lug on the sleeve.

The whole cylinder block is an aluminum casting, without special lining, as all of the wear comes on the inside of the sleeve. An experimental engine that has been built developed a torque of 110 pounds (length of brake arm not given) at 1400 r. p. m. The spark plugs are located centrally in the cylinder heads. This engine will run up to 2700 r. p. m., it has been definitely stated..

The exhaust ports have their top edge on a line with the bottom of the inner head and are 2 7/18 inches wide, measured circumferentially. They afford a very direct passage for the exhaust gases from the cylinder and this is believed to have a tendency to keep the cylinders free from carbon.

Lubrication is by the force-feed system, oil being fed under a pressure of 5 to 10 pounds per square inch to the three main bearings and through drill holes in the crankshaft to the crankpin bearings. Oil thrown off from the crankpin bearings lubricates all the other internal parts. The sleeve operating shaft, as will be seen, is chain-driven. (*Automotive Industries,* vol. 38, No. 20, May 16, 1918, p. 953. *d.*)—*Jour. A. Sc. of Mech. Engineers,* July.

THE PROPERTIES OF OILS[1] AND THEIR RELATION TO LUBRICATION.—George B. Upton.[2]—The ordinary users of oils for lubrication of machinery, and many of the sellers, have very little notion of what those properties of oils are which are concerned in lubrication, and how lubrication comes about. Hence the following brief sketch of the meanings and purposes of various tests to which oils may be put.

1. *Test for Acidity.*—Acids in oils, in amounts greater than traces, cause rusting and pitting of metal surfaces, and will soon put shafts or bearings out of commission. Alkalies must also be avoided. Oils should be chemically neutral, neither acid nor alkaline. All oils form acids more or less rapidly in the presence of heat and moisture; more rapidly the greater the heat. With mineral oils this action is usually neglible; with animal and vegetable oils it is considerable. Soaps used to alter the viscosity of oils also decompose by heat. Mineral oils are often bleached during the manufacture by the use of sulphuric acid, which may fail of removal or neutralization in the later processes, and so remain in the oil as sold. An oil which is neutral when purchased, and which does not get very hot in use, can be expected to stay neutral.

2. *Test for Ash.*—All pure oils, when heated and ignited in the open air, burn quite completely, leaving almost no ash. Mineral soaps put into the oils leave ash. The ash test, therefore, becomes practically a test for the presence of soaps in the oil. Whether or not these soaps are objectionable depends upon the use to which the oil is put. Soaps usually raise the viscosity of oils. Soaps are used freely in greases, and generally without

[1] The *Sibley Journal of Engineering,* Cornell University.

[2] Assistant Professor in Experimental Engineering, Sibley College, Cornell University.

objection. If the oil is to be used hot, however, the soap is liable to decompose and cause trouble by rusting of metals.

3. *Test for Carbon Residue.*—The oils consist principally or entirely of chemical compounds of carbon and hydrogen (hydrocarbons). About 90 per cent by weight of the oil is carbon in the ultimate analysis. When heated very hot the hydrocarbons decompose partially, forming volatile combustible gases and heavier hydrocarbons, or carbonaceous matter, and even elementary free carbon. Such free carbon (and carbonaceous matter), is always in solution or suspension in oils to some extent, from the processes of manufacture. Heated very hot in closed vessels, without ignition, the oils partially distill unchanged, and partially decompose. When this action is carried to the end point there is left in the flask a thin deposit of "carbon residue." Animal and vegetable oils, and mineral oils loaded with rosins or soaps, leave larger "carbon residues than pure mineral oils, for which the residue is only a fraction of one per cent.

The "carbon residue" test has practically nothing to do with the amount of "carbonizing" by the oil in the cylinders and on the pistons of internal combustion engines, though it is often so taken. The conditions of the test are utterly different from the conditions in the engine cylinder. In the cylinder the oil is spread out in thin films on hot metal, and exposed to the burning gases of the "explosion." These gases may or may not carry an excess of oxygen to combine with the heated oil. The amount of carbon formed in the cylinder depends on the amount of oil reaching the cylinder and the conditions of exposure in the cylinder. The amount of oil depends on the mechanical fit of piston and cylinder, especially the condition of the piston rings, and on the viscosity of the hot oil on the cylinder walls. The lower the viscosity the more oil will go up past the pistons. After the oil has gone past the pistons a "lean" mixture in the combustion space will have excess oxygen to burn up the oil more or less completely, while a "rich" mixture will not have excess oxygen, the oil cannot burn, and the rich mixture may itself be depositing lampblack carbon.

4. *Oxidation Test.*—Oils gradually oxidize by contact with air at exposed surfaces of oil. The rate of oxidation increases with temperature. The product of the oxidation is resinous or gummy, and spoils the oil as a lubricant if such oxidation occurs. Mineral oils oxidize very little or not at all. Some, but not all, of the animal and vegetable oils oxidize very rapidly. An extreme case is that of linseed oil. The action commonly called "drying" of paint is really the oxidation of the linseed oil. A lubricating oil should be practically non-oxidizing.

An oxidizing oil brings in a considerable fire risk, because when spread out thin on an oily waste or cloths it will often oxidize so rapidly at ordinary temperatures as to start "spontaneous combustion." This does not happen with a non-oxidizing oil. Any oily waste will burn strongly after ignition; but a lubricating oil ought not to be able to start a fire of its own accord.

5. *Volatility Test.*—Oils vaporize without chemical change, just as water does. In some cases, where the oil is kept quite hot, the loss of oil by this vaporization, or volatility, may be perceptible. Usually the vaporization loss is small, and even less than leakage losses from a machine. Mineral oils are generally more volatile than animal or vegetable oils. Volatility of lubricating oils is of little practical importance.

6. *Surface Tension, or Capillarity.*—This and the adhesion of oil to metal surfaces, are the forces which cause oil to spread over the metal, and to crawl into the thin spaces between bearing and shaft, or piston and cylinder, while the metal parts are at rest. Animal and vegetable oils adhere better to metal surfaces than do mineral oils. This property is especially important in steam engine valve and cylinder lubrication, where the oil must adhere to the metal so strongly that water, and the tendency of oil to float on water, cannot remove the oil film. Mineral oils, pure, may

be displaced from a steam engine cylinder wall or valve seat by hot water. The adding of small amounts of animal or vegetable oil to the mineral steam cylinder oil helps the oil film to adhere. The good effect is important enough to counter-balance the bad tendency of the animal or vegetable oil to form acids. Where water is absent the mineral oils stick well enough on metal surfaces. Surface tension of lubricating oils is not usually noticed in testing.

7. *Color Test.*—Color of oil has no connection with lubrication. It results from the details of the manufacturing process. Mineral oils are naturally dark, or dark red, until the carbon and carbonaceous matter are removed by filtration or bleached by sulphuric acid. The removal or bleaching of the carbon and carbonaceous matter probably does little to affect the lubricating properties, though it may make the oil prettier to look at.

8. *Emulsion Test.*—A very simple test to check the purity of a mineral oil is the emulsion test. Fill a clean bottle about a quarter full of clear water (preferably distilled), and another quarter full of the oil. Shake vigorously until oil and water form an emulsion. Allow to stand for 24 hours. A pure distilled mineral oil separates completely from the water, which remains clear. Acids, soaps, rosins, etc., make emulsification easier, prevent the complete separation of oil and water, and leave the water cloudy. There will often be, after the separation, a layer of leathery foam between the oil and the water. The emulsion test is a rough one; it takes a chemical analysis to work out the real reasons for the actions shown. The fact that an oil will or will not readily form an emulsion with water is often of importance in judging whether the oil will feed or not, as an oil pump suction will not work on the foam.

9. *Flash Point, and Burning Point or Fire Test.*—It has been mentioned that when heated to high temperatures oils decompose chemically, the hydrocarbons breaking up into volatile combustible gases and carbonaceous matter, or even free carbon. The flash point is the lowest temperature at which the decomposition of the oil by heat becomes demonstrable through the formation of a combustible, slightly explosive gas mixture over the oil surface. The burning point, or fire test, is the lowest temperature at which the production of combustible gas from the oil is so rapid as to maintain combustion after ignition. The oil does not ignite itself merely because it is at or slightly above the flash point or the burn point; external ignition is necessary.

These tests originally came in because of fire risk. The flash and burn points of lubricating oils were a generation ago often as low as 200° to 300° F. An ordinary hot bearing was potential material for a bad fire, for an oil fire is hard to stop after it gets under way. With improvements in the manufacture of oils, the flash and burn points have been raised so that they now lie usually above 300° F., and often above 400° F.

As regards fire risk, the flash point of lubricating oils is of little consequence; the burn point is the more important of the two. As regards the use of the oil as a lubricant, the flash point puts an upper limit to the temperature of use of the oil, because the chemical decomposition changes the properties of the oil, and the formation of gas in an oil film will break the film. It is quite possible, even probable, however, that the practical upper temperature limit for the use of an oil as a lubricant occurs below the flash point, from the decrease of viscosity of the oil with rising temperature. We test for flash and burn points, therefore, to catch any oil which might bring fire risk from having these points too low, and to be sure that the flash point occurs at a temperature higher than the highest temperature at which the oil is to act as a lubricant.

There are a number of places in machinery where oils have to lubricate at decidedly high temperatures. Steam engine cylinder oils must lubricate valves and pistons at the temperature of high pressure steam, somewhere from 300° to 400° F.; with superheated steam even higher. Automobile

cylinder oils must lubricate the pistons in the cylinders with a temperature in the oil film of 250° to 350° F. In this case a further requirement is put upon the oil that that portion of it which goes up past the pistons must burn up quickly and cleanly. Hence, the flash and burn points of automobile engine oils must be neither too low nor too high, say not under 400° nor over 500° F. for water-cooled engines. Stationary gas engines and marine engines run colder than automobile engines, and the flash and burn points of their oils may be lower.

10. *Heat Test.*—While the oil is undergoing decomposition by heat we are interested not only in the gases given off, which give the flash and burn tests, but also in the solid or semi-solid products of the decomposition. These substances, carbon or carbonaceous matter, remain in the oil. At present there is no standardized test on this line, paralleling the flash and burn test. It may be suggested that after the flash point temperature is known, another sample of the oil might be held for half an hour at the flash point temperature, without ignition, and then be poured off into a test tube and set away for 24 hours. It should then be examined for quantity and quality of carbonaceous matter and carbon present in suspension or settled out. Some oils form almost no carbon under this action; others will show a carbon deposit of one quarter the volume of the oil in the test tube. Probably these latter oils would be unsuitable for high temperature use.

The accumulation of carbon and carbonaceous matter may choke oil pipes and feed holes, and the carbon may act as a mild abrasive in bearings. The viscosity of oil tends to be slightly raised by the carbon; but the simultaneous formation of light hydrocarbons in the oil counterbalances this. The accumulation of this carbon is one of the reasons why the used oil should be periodically cleaned out of the crank case of an automobile engine. The oil which splashes up to the inside top of the pistons is spoiled on the hot metal, then drops back into the rest of the oil.

11. *Cold Tests.*—As oils are cooled they increase rapidly in viscosity, that is, become stiff or sticky liquids. They may become so stiff that they will not flow at a rapidly measurable rate under the action of gravity. The temperature at which, in cooling, oil first gets too stiff for gravity flow is called the temperature of the pour test. Since gravity flow is very commonly relied upon to move the oil along feed pipes to bearings, cooling below the pour test temperature stops the feeding of the lubricant. On this account the pour test is of considerable importance as a low temperature limit to the use of the oil. Full force feed systems of supply of oil to bearings continue to work below the pour test temperature, down to or near to that temperature where the oil becomes practically a solid substance.

Between the pour test temperature and the solidifying temperature oils are, in appearance and lubricating action, what "greases" are at ordinary temperatures. Some "greases" are in fact merely oils with pour test temperatures above instead of below ordinary room temperatures. Some oils, of animal or vegetable origin, freeze as water does, at one temperature, changing suddenly from a thin liquid to a rigid solid. Most oils, however, become progressively more and more stiff or solid during cooling, with pour test temperatures somewhere between 40° and 0° F., and solidifying temperatures perhaps 40° or 50° F. lower still.

A cold test commonly made, but of no apparent practical application, is the cloud test. Many oils contain paraffin or similar waxes in solution, and in cooling throw this wax progressively out of solution as the temperature goes below a certain point. This point is that of the "cloud test," because the separation of the wax clouds the previously transparent oil. The cloud test is usually at a higher temperature than the pour test. The cloud test may be called the temperature of beginning of the partial solidification of the oil, which partial solidification may be in part responsible for the action (or lack of action) at the pour test temperature.

In many of the present automobile engines the oil feed piping is internal to the engine. In such an engine even the pour test of the oil becomes of little consequence. If the oil is fluid enough to let the cold engine be started at all, the heat of friction will soon lessen the viscosity of the oil, and the chances are that the oil will be feeding properly by the time the engine will be ready to change from idling to appreciable power production. If the oil feed piping were external to the engine, not engine heat, it would behoove the user of the engine to be very careful in the winter time about the pour test temperature of the oil.

12. *Density.*—Density of oils is probably the property most often misunderstood and misinterpreted. Density is commonly measured and quoted in the oil trade in terms of an obsolescent scale, the scale of "Beaumé light" on a hydrometer. The relation between "Beaumé numbers" and ordinary densities, or specific gravities, with water as unity, is $\text{density} = \frac{140}{130 + (\text{Beaumé number})}$. Thus Beaumé number 29.0 means a density of $\frac{140}{130+29} = \frac{140}{159} = 0.880$. In strict accuracy, Beaumé number 10.0 corresponds to water as 1.000 at 60° F., where the real density is 0.998 on the scientific scale, which takes water as unity at its maximum density (at 4.0° C.)

Density of oils has nothing to do with lubrication by the oils; lubrication does not depend in any way upon density as a specific property of the oil. When we speak of oils as "light," "medium," or "heavy," the property concerned is viscosity. "Light" means low viscosity; "heavy" means high viscosity. These technical usages of the words "light" and "heavy" are extremely unfortunate and highly misleading. They go back historically to a time when it was thought that oils of high viscosity were necessarily also of high density. That there is no such connection between the two properties may be readily brought out by citing liquids other than oils. Three common liquids have the properties at zero degrees Centigrade: water, density 1.00, viscosity, 0.018 c.g.s. units; mercury, density 13.60, viscosity, 0.017; glycerine, density 1.27, viscosity 46.0. It is true that oils made by the same process from the same crude oil have higher densities as they have higher viscosities; but change of process with the same crude oil as base slightly dislocates this relation of density and viscosity, and change of the crude oil entirely dislocates it.

What the density does tell concerning the oil seems to be the source of the oil—what kind of crude oil was used. Thus densities above 0.90 (Beaumé numbers less than 27) indicate in this country that Texas crude oil was used as a base; densities below 0.90 (Beaumé numbers greater than 27) indicate Pennsylvania crude oil as base.

Density has an important commercial application when it is used to identify oils. Let it be supposed that a certain firm has by many trials found that one brand and grade of oil is for them the best for one use, saves the most power and gives the least cost of repairs to machinery and time out for repairs. (Cost of oil itself is less important than the value of power saving and repair saving). Before ordering more of this oil from the jobber the firm measures the density of the oil. If they find that the new shipment of supposedly the same oil has very closely the same density as the original, it is practically certain that they got what they ordered.

In the complete testing of oils density determination is necessary as an accessory to the common types (flow types) of viscometers. These instruments measure not viscosity but the ratio of viscosity to density, so that density must be known before viscosity can be computed.

13. *Viscosity.*—Viscosity is the most important property of oils as regards lubricating action. It is practically the controlling factor, so far as the oil is concerned, in the formation and maintenance of the oil film between metal parts when the parts are in motion. Viscosity is the internal friction

of fluids, the force resisting the movement of one layer of oil past the next. A liquid which, like steam engine cylinder oil or tar, is "thick" or "stiff," and does not flow readily, has high viscosity; a liquid which is "thin," flows readily, like water, has a low viscosity. If two parallel metal surfaces of area A, distance x apart, have the space between them filled with oil of viscosity η, and move past each other with the velocity V, then the viscous force F opposing the motion is $F = \frac{AV\eta}{x}$, or viscous force = (area of oil film) (velocity difference at the two surfaces of the film) (viscosity) ÷ (thickness of film). Inverting this equation $\eta = \frac{Fx}{AV}$. With the forces, distances, areas, and velocities in foot-pound second or centimeter-gram-second units respectively, this equation tells the measurement. The numerical values quoted above for water, mercury, and glycerine are in c.g.s. units. The equation for viscous force is often written $F = A\eta\left(\frac{V}{x}\right)$ in which the ratio $\frac{V}{x}$ is called the "velocity gradient."

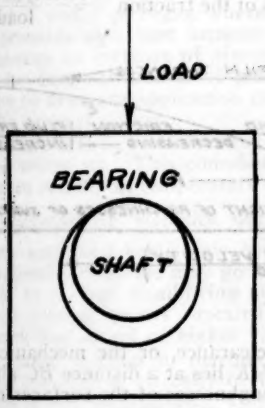


FIG. 1.—Shaft at Rest; Load On.

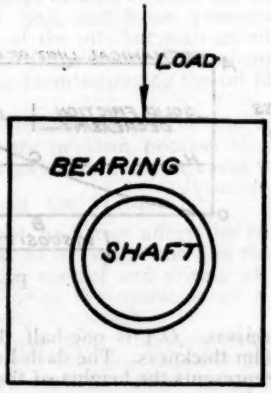


FIG. 2.—Shaft Running; Oil Film Formed.

When a shaft is at rest in a bearing, with load on, the shaft and bearing are in metallic contact on the side toward the load. The shaft being smaller in diameter than the inside of the bearing, there remains a thin crescent-shaped space between shaft and bearing metal on the side away from the load. This space will fill with oil, while the shaft is at rest, by the action of surface tension or capillarity, even against the action of gravity. The relation of parts is as shown in Fig. 1.

When the shaft starts to turn, oil sticks to the shaft and tends to carry around with the shaft to form a film of oil between shaft and bearing on the side toward the load. The bearing, because of the load, tries to wipe this oil off the shaft, or to prevent the oil from going through. The oil layer in contact with the bearing metal stays stationary in any case. The result of the actions of the moving shaft and the stationary bearing metal is a motion of oil layer on oil layer, a motion which brings in the forces due to the viscosity of the oil.

The viscous force tries to push a wedge-shaped film of oil through between shaft and bearing. The wedge is a bent one, as shown in Fig. 1. The force carrying oil into the wedge increases both with the velocity of the shaft surface and with the viscosity of the oil, or is proportional to

the product of velocity by viscosity. This viscous force has against the load on the bearing the mechanical advantage of the wedge, an advantage measured by the ratio of diameter of shaft to clearance of bearing (difference of diameter of shaft and bearing). When the viscous force, or product of viscosity by velocity, becomes large enough, the oil film rather suddenly carries through and shaft and bearing take the relative positions shown in Fig. 2. The oil film must of course always be thinner on the load side than on the unloaded side, but with good lubrication the shaft does come appreciably near to running concentric with the bearing. In other words, the thickness of the oil film toward the load, where the film is thinnest, approaches as a limit, but does not reach, one-half the clearance. There is thus a mechanical limit to the thickness of the oil film.

Because of the relationships of forces just outlined, the thickness of the oil film toward the load in any given bearing depends upon the value of the fraction $\left(\frac{\text{viscosity}\times\text{velocity}}{\text{load}}\right)$. The change of thickness of oil film with change of this fraction is shown in Fig. 3. The curve *OCEF* has film thickness for its ordinates and values of the fraction $\frac{\text{viscosity}\times\text{velocity}}{\text{load}}$

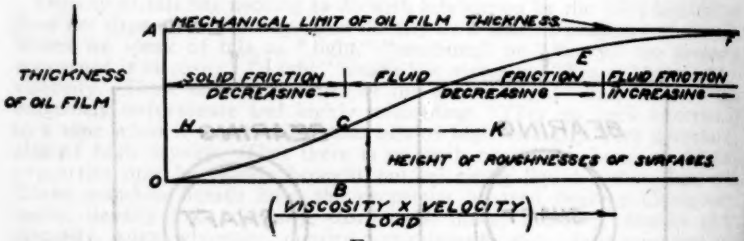


FIG. 3.

for its abscissas. *OA* is one-half the clearance, or the mechanical limit to the oil film thickness. The dash line *HK* lies at a distance *BC* above the base, and represents the heights of the roughnesses of the surfaces of bearing and shaft.

The course of events in lubrication during the starting up of machinery may be followed from Fig. 3. With velocity zero the fraction $\left(\frac{\text{viscosity}\times\text{velocity}}{\text{load}}\right)$ is zero, and there is no oil film (point *O*, Fig. 3). As velocity increases the fraction $\left(\frac{\text{viscosity}\times\text{velocity}}{\text{load}}\right)$ increases in proportion. The oil film builds slowly at first, and the bearing and shaft remain in partial metallic contact, with high friction. At some critical value of velocity the oil film becomes thicker than *BC*, Fig. 3, and metallic contact ceases. Thence onward to higher values of $\left(\frac{\text{viscosity}\times\text{velocity}}{\text{load}}\right)$ the friction of the bearing is entirely due to the oil. From *C* to *E* the oil film builds up rapidly; beyond *E* further change of the abscissas causes little increase of film thickness. Along *CEF* and beyond we are dealing with what is often called "perfect" lubrication. The term should more properly be "complete" lubrication. Between *O* and *C* lubrication is "imperfect" or better "incomplete." The formation of the oil film by viscosity and velocity action as described above is known as the "Tower effect."

The fluid friction of a bearing is given by the equation above for viscous force, $F = \frac{AV\eta}{x}$ = (area of oil film) (velocity of shaft surfaces) (viscos-

ity of oil) ÷ (thickness of oil film.) The form of this equation which strictly applies is $F = \eta V \int \frac{dA}{x}$, since the thickness x of the oil film varies from one element dA of area to another, both because of roughnesses of surfaces and because the shaft is not concentric with the bearing. This equation, together with the relation shown in Fig. 3 governing thickness of oil film, gives the outline of the variations of fluid friction of bearings with changes of speed, load, and viscosity.

In the region from C to E, Fig. 3, thickness of oil film changes more rapidly than does the abscissa $\left(\frac{\text{viscosity} \times \text{velocity}}{\text{load}}\right)$. Putting this with $F = \frac{\eta V A}{x}$ shows that while the oil film thickness is rapidly increasing the fluid friction is decreasing the factor x dominating the function. Beyond E and F, Fig. 3, the oil film has a practically constant thickness, set by the clearance of the bearing. In this region, then, since x cannot vary, increase of velocity or viscosity will increase the friction; but decrease of load will not decrease or increase the friction. Fluid friction in the ordinary bearing is not independent of load because the bearing is working in the region between C and F of Fig. 3, where change of load changes the film thickness. It is possible also that increase of load, and hence pressure in the oil film, causes an increase of viscosity of the oil; but such an effect remains yet to be demonstrated as of practical importance. The seizing of a bearing due to pressure application comes from squeezing the oil film down till metallic contact occurs.

After a machine is under way the friction causes the film and the bearings to warm up. This complicates the problem, because viscosity of oils decreases rapidly as temperature increases, especially at lower temperatures. The decrease of viscosity decreases the fraction $\left(\frac{\text{viscosity} \times \text{velocity}}{\text{load}}\right)$ velocity and load being now constant, and may affect the film thickness. The viscosity decrease may go so far as to change the film thickness from F to E to C, Fig. 3, allowing metallic contact and seizing of the bearing. If such seizing occurs repeatedly during the operation of a machine, it indicates that an oil of higher viscosity is needed.

Excessive friction in machinery may occur therefore from either too low or too high a viscosity of the oil. Too low viscosity means that the oil film is not maintained. Too high viscosity, while the oil film is "perfect," gives excessive friction in the oil itself. Anyone who has cranked an automobile engine in the winter time appreciates the possibility of having too much viscosity in the oil. Too low a viscosity, with seized bearings, wrecks the machinery; too high a viscosity causes no damage to bearings, but is inefficient. The highest efficiency comes from going as near to seizing as we dare, while still playing safe.

Because viscosity varies so rapidly with temperature, and the variation is at different rates in different oils, we need in testing the oil for viscosity to find the viscosity as a function of temperature. A knowledge of the viscosity value at one temperature is not sufficient. What we need most to know is the viscosity of the oil at the temperature at which it must operate with the most severe running conditions of the machine in which the oil is used. We must be sure of having enough viscosity to maintain the oil film under the extreme conditions of operation. Then we put up with the higher viscosities when the oil is colder. Usually the range of temperature through which the oil must lubricate is narrow enough so that we can have both enough viscosity at the high temperatures and not too much at the low temperatures. In extreme cases, as the operation of an automobile engine in the winter time, we cannot get enough viscosity left at high temperatures without getting excessive viscosities at starting of the cold

engine. The range of temperatures is too wide, considering the unavoidable and uncontrollably rapid change of viscosity with temperature. The ideal would be an oil which did not change viscosity with temperature.

It can readily be shown that the fluid friction of a roughed surface bearing is greater than that of a smooth one, other things being the same. From $F = \eta V \int \frac{dA}{x}$ with η and V the same in the two cases, F varies as $\int \frac{dA}{x}$ Let the total area in each case be 2, and the average film thickness be 2. In the rough one let the two halves of the film area have thickness of 1 and 3; in the smooth one 2 and 2. Then $\int \frac{dA}{x}$ for the rough one will be $(\frac{1}{1} + \frac{1}{3}) = 1.33$; and for the smooth one $(\frac{1}{2} + \frac{1}{2}) = 1.00$. It should be said, however, that in practice the smoother bearing would probably be made with less clearance than the rougher; and in turn the oil used in the smoother bearing would be of lower viscosity. The change in the automobile engine from hand scraped bearings to reamed bearings will probably bring about all these changes in succession.—*Scientific American Supplement*, 1/6.

AERONAUTICS

TRANSATLANTIC FLIGHT POSSIBLE TO-DAY.—By Alan R. Hawley, President of the Aero Club of America.—The planes to fly across the Atlantic have reached the practical stage of development where it is only a question of deciding which of the four types of available aeroplanes to use in the first flight.

The Aero Club of America officials agree in every way with the statements of Major General William Brancker regarding the feasibility of making the transatlantic flight this coming September.

Being Controller General of Air Equipment of the British Air Ministry and having been Deputy Director General of Military Aeronautics, and having had extensive practical experience in actual flying and training of aviators for the past two years, he knows what he is talking about. He knows the problems of flying across the Atlantic, the types of machines available in England, France and Italy to make the flight, and knows that there are scores of tried and tested aviators ready and anxious to make the flight.

Two of the four types of aeroplanes which can be used to make the flight are American made. One has been offered to the Aero Club by Captain James V. Martin, the veteran aviator and aeroplane constructor, of Aleria, Ohio. Captain Martin, who is a master mariner and member of the United States Naval Auxiliary Overseas Force, has submitted a very scientifically worked out plan, proving by actual figuring why his aeroplane can fly across the Atlantic without stopping.

It is well to state here that plans of the committee of the Aero Club which has charge of developing the plane for the transatlantic flight for the past four years show that there are seven different ways and five routes for the transatlantic flight. The club has had plans submitted for every one of these planes and for each of the routes, and for every type of aircraft, lighter as well as heavier than air.

For obvious reasons the plan to fly across the Atlantic by using the southern route, from Pernambuco, Brazil, to Cape Verde, Africa, which is only about 2000 miles, with the Island of St. Paul on the way, and the northern route by way of Labrador, Greenland, Iceland, Faroes Islands, to England, cannot be considered. In each case the flight over water is shorter than by the other routes, but they are not practical at present.

The seven ways of flying across the Atlantic and the three routes being considered for the first flights are as follows:

(1) By means of large aeroplanes capable of flying the 3000 miles from New York to Ireland without stopping. The construction of such aeroplanes is considered possible by prominent aeroplane manufacturers. They will be assisted by trade winds.

(2) By means of flying boats and hydroaeroplanes, starting from New York and flying to Ireland, stopping to take fuel from ships stationed at every three hundred miles along the route.

(3) By means of land aeroplanes, large or small, starting from Newfoundland and flying to Ireland, a distance of 1,860 miles, without stopping. The construction of aeroplanes capable of doing this is considered easy by prominent manufacturers. They will be assisted by trade winds.

(4) By means of flying boats and hydroaeroplanes, starting from Newfoundland and flying to Ireland, 1860 miles, taking on gasoline from ships stationed at three hundred miles along the route.

(5) By means of land machines, large or small, flying from Newfoundland to the Azores, 1195 miles, and from the Azores to Portugal, 850 miles.

(6) By means of hydroaeroplanes flying from Newfoundland to the Azores and from the Azores to Ireland, taking on fuel from ships stationed 200 miles apart along the route.

(7) By means of flying boats, flying from Newfoundland to the Azores, and take on fuel there.

General Brancker points out that it is possible to make the flight by both seaplane and land aeroplane, but for the flight to the Azores he points out, very rightly, that the seaplane will be the best, because it can easily land on the water, while it would be difficult to establish a landing place for a land aeroplane.

The plan proposed by Handley Page is to cross the Atlantic with a large land aeroplane. This is also the plan of Caproni. But in each case the British and Italian authorities also consider practical the plan to make the transatlantic flight with a seaplane.

The American propositions to cross the Atlantic include a plan to do it with a seaplane of the flying boat type, and several with land aeroplanes.

Because all the propositions considered are good, Mr. Robert J. Collier, member of the Board of Governors of the Aero Club of America, who has been interested in plans to fly across the Atlantic for a number of years, proposes the very interesting plan of having the flights across the Atlantic by the representatives of the different countries take place simultaneously. This would afford a comparative test for the different types of aeroplanes employed, and would make it possible to come to conclusions as to which type is best. If the plans being considered were to be followed in such a test, the flights would be on the three routes mentioned above.

As the main purpose of the transatlantic flight, as stated by General Brancker, is to show the practicability of delivering warplanes in large number from the United States to the Allies, and whereas both seaplanes and land aeroplanes are needed to insure aerial supremacy to the Allies, both on land and sea, everything is to be gained by testing every one of the plans submitted.

The Aero Club of America is co-operating closely with the government authorities, and every one of the plans are referred to the government authorities. The club is only anxious to co-operate in getting this thing done, therefore it is willing to help the government to do it, or if it would help the government more to have the club undertake the entire work, the club is ready to do it.—*Flying*, July.

AIRCRAFT MAY FLY OVER THE ATLANTIC.—An airplane flight across the Atlantic may be made for the first time in history within a few months. This was indicated to-day by Major General William Brancker of the

British Air Ministry, in an interview with newspaper-men on the general situation of aerial warfare.

Although no details of the first flight were made known, General Brancker stated that the British and American governments had been in consultation on the project.

Practicability to be Determined.—The flight is not to be attempted as a spectacular deed, but to find out if it would be possible to have America's airplanes fly to the other side as they are completed, thereby releasing shipping that would be required to transport them.

General Brancker indicated that if a trial flight is made, the first landing probably would be the Azores. He expressed the opinion that weather conditions alone remain as a serious obstacle to transatlantic flying. He indicated that the Allies have developed a plane that is capable of making the trip.

He estimated that it should not take more than 40 hours to cross, and said the pilot probably could go at about 85 miles an hour. Four men, it is figured, would be necessary in each plane to allow for a shift of pilots and for attending to the engine.

Trial Flight in Fall.—Although it is likely that a trial flight will be made in the fall, it is probable that no attempt will be made to fly a large number of planes across before next summer.

General Brancker pointed out that England has flown thousands of planes across the English Channel with an actual loss of only one man by drowning.

In a general outline of the entire aircraft problem, General Brancker declared that whoever strikes the hardest blow will win the war and that he is certain the hardest blow in the air will be struck by the Allies.—*Evening Star, 21/6.*

INCREASING EFFECTIVENESS OF ANTI-AIRCRAFT ARTILLERY.—Aerial progress has not been confined to the air, for anti-aircraft artillery, if it can be considered as part of aerial activity, has advanced by leaps and bounds of late. At present it is a common occurrence to hear that an enemy machine has been brought down by anti-aircraft fire. Typical of this advance is the case of the 10th section of French anti-aircraft artillery of the mobile type, which, during the period from September, 1915, to December, 1917, alone brought down 13 German airplanes. During the period from February 11 to 20, last, the anti-aircraft artillery of the French army brought down four machines. In each case the number is based on official recognition, which means that the destruction of each enemy machine was established beyond doubt.—*Scientific American, 29/6.*

IMPORTANCE IN NUMBERS IN AERIAL WARFARE.—By Dr. J. G. Coffin and H. T. Booth, The Curtiss Engineering Corp.—The English pioneer in the science of aeronautics, F. W. Lanchester, has several chapters in his book, "Aircraft in Warfare," which merit far more attention than they have yet received. The book teems with predictions written during the period immediately following the outbreak of hostilities, September to December, 1914, which by now have been borne out in a most complete and astonishing fashion.

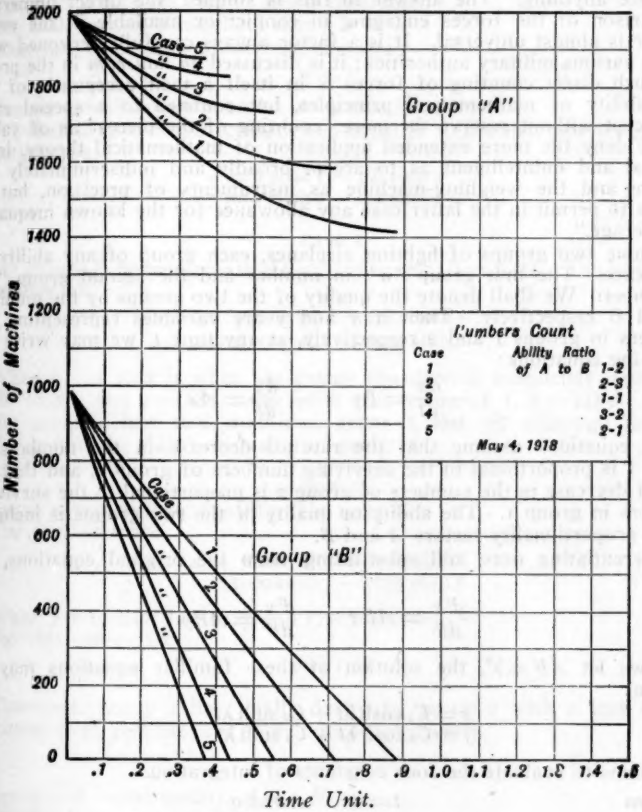
Two chapters on the effect of concentration are especially interesting when applied to aerial warfare, and they point the way quite clearly toward aerial supremacy. The results are given without demonstration, and partially on this account, as well as on account of the intrinsic information therein contained, the present article seems to us to be not without interest, especially at the present time.

The devising and building of a new type of airplane which has "quality" superiority over the best existing type is a slow, difficult and costly process. The emphasis is on the word "slow." Time is precious just now, and an important question immediately arises: By what factor can

"quality" be overcome? The answer is conclusive; it is "number" or "quantity." We do not deny any advantage derivable from quality, but quantity is at once obtainable.

There are in existence to-day a number of very efficient fighting machines of the different types. Any new "quality" which can conveniently be incorporated in the machines is, of course, an added advantage, but, as the article shows, the superiority of quantity is overwhelming.

In the past when fighters met man to man, it was seldom that many concentrated upon one; superiority in numbers was almost in direct pro-



GRAPH SHOWING VALUE OF QUANTITY.

portion to the numbers themselves; the losses were about equal, under conditions equal except as to numbers, and the more numerous won on that account alone.

"Nowadays," writes Lanchester, "with firearms, the possible concentration of superior numbers gives an immediate superiority in the active combatant ranks, and the inferior force finds itself under a far heavier fire, man for man, than it is able to return."

We have made some calculations of our own based on an assumption stated very clearly by Lanchester. His statement amounts to the following: The rate of mortality in one group of fighters is directly proportional to the numbers (and to the quality) in the opposing group and *vice versa*.

The results of this assumption are certainly at first sight astonishing. While no one claims that battles are fought which result in an exact agreement with the calculated results, the general principle is so definite and convincing that its approximate validity cannot seriously be questioned.

Lanchester says: "There are many who will be inclined to cavil at any mathematical or semi-mathematical treatment of the present subject on the ground that, with so many unknown factors, such as the morale or leadership of the men, the unaccounted merits or demerits of the weapons, and the still more unknown 'chances of war,' it is ridiculous to pretend to calculate anything. The answer to this is simple: the direct numerical comparison of the forces engaging in conflict or available in the event of war is almost universal. It is a factor always carefully reckoned with by the various military authorities; it is discussed *ad nauseam* in the press. Yet such direct counting of forces is in itself a tacit acceptance of the applicability of mathematical principles, but confined to a special case. To accept without reserve the mere 'counting of the pieces' as of value, and to deny the more extended application of mathematical theory, is as illogical and unintelligent as to accept broadly and indiscriminately the balance and the weighing-machine as instruments of precision, but to decline to permit in the latter case any allowance for the known inequality of leverage."

Assume two groups of fighting airplanes, each group of any ability or excellence. The first group "a" in number and the second group "b" in number. We shall denote the quality of the two groups by the numbers A and B respectively. Then if x and y are variables representing the numbers in groups 1 and 2 respectively, at any time t, we may write the following equations:

$$-\frac{dx}{dt} = By \qquad -\frac{dy}{dt} = Ax \tag{1}$$

These equations assume that the rate of decrease in the numbers of group 1 is proportional to the surviving numbers of group 2, and that the rate of decrease in the numbers of group 2 is proportional to the surviving numbers in group 1. The ability or quality of the two groups is included in the proportionality factors A and B.

Differentiating once and substituting from the original equations, we obtain:

$$\frac{d^2x}{dt^2} = ABx \qquad \frac{d^2y}{dt^2} = ABy \tag{2}$$

If we let $AB = \lambda^2$, the solution of these familiar equations may be written:

$$\begin{aligned} x &= C_1 \cosh \lambda t + C_2 \sinh \lambda t \\ y &= C_3 \cosh \lambda t + C_4 \sinh \lambda t \end{aligned} \tag{3}$$

It remains to evaluate the four constants of integration.

When $t = 0$ $x = a$

$t = 0$ $y = b$

so that $C_1 = a$ $C_3 = b$

Since

$$\frac{dx}{dt} = -By = C_1\lambda \sinh \lambda t + C_2\lambda \cosh \lambda t$$

$$-Bp = C_2\lambda$$

so that $C_2 = -\sqrt{\frac{B}{A}}\, b$

Similarly $C_4 = -\sqrt{\frac{A}{B}}\, a$

The general equations expressing the course of events then become:

$$x = a\cosh\lambda t - b\sqrt{\frac{B}{A}}\sinh\lambda t \qquad (4)$$

$$y = b\cosh\lambda t - a\sqrt{\frac{A}{B}}\sinh\lambda t$$

The solutions are symmetrical functions of $\lambda = \sqrt{AB}$, hence in order to obtain results comparable on the time scale, we shall maintain constant the product AB as we vary A and B separately.

We shall assume throughout that $a > b$.

There are three cases of interest, namely:

$$A < B \qquad A = B \qquad A > B$$

For numerical computation let $a = 2000$ $b = 1000$.

We shall keep $\lambda^2 = AB$ constant and equal to 1, in which case the general equations are:

$$x = a\cosh t - Bb\sinh t \qquad (5)$$
$$y = b\cosh t - Aa\sinh t$$

CASE I

Let $A = \frac{1}{2}B$, hence because $AB = 1$, $A = .707$, $B = 1.414$. The numerical equations are:

$$x = 2000\cosh t - 1414\sinh t$$
$$y = 1000\cosh t - 1414\sinh t$$

When $y = 0$, that is when the enemy squadron is completely destroyed, $\tanh t = .707$ and $t = .881$ units. For this value of t, $x = 1413$. Hence while group 2 lost 1000 machines, group 1 lost 587 although group 1 had only half the ability or quality of group 2.

CASE II

Let $A = \frac{2}{3}B$ so that $A = .815$, $B = 1.224$.

The equations are:

$$x = 200\cosh t - 1224\sinh t$$
$$y = 1000\cosh t - 1633\sinh t$$

When $y = 0$, $\tanh t = .6125$ and $t = .713$ units.

For this value of t

$$x = 1581$$

Therefore, group 1 has totally destroyed group 2 with a loss of 419 machines only, just because of numerical superiority.

CASE III

Let $A = B$, equal quality, $A = 1$, $B = 1$.

For this case

$$x = 2000\cosh t - 1000\sinh t$$
$$y = 1000\cosh t - 2000\sinh t$$

When $y = 0$, $\tanh t = .500$ and $t = .55$ units

When $t = .55$

$$x = 1732$$

So that when the second group was totally destroyed, there remained 1732 machines in the first group, the net result being a loss of only 268 to the enemy's 1000.

CASE IV

$A = \frac{8}{9} B$, greater numbers, better quality $A = 1.224$, $B = .815$

$$x = 2000 \cosh t - 816 \sinh t$$
$$y = 1000 \cosh t - 2450 \sinh t$$

When $y = 0$, $\tanh t = .408$ and $t = .433$ units
When t has this value

$$x = 1826$$

The first group suffered a loss of only 174 to 1000 of the second.

CASE V

$A = 2B$ $\qquad A = 1.414$ $\qquad B = .707$

$$x = 2000 \cosh t - 707 \sinh t$$
$$y = 1000 \cosh t - 2828 \sinh t$$

When $y = 0$, $\tanh t = 0.353$ and $t = 0.370$ units

$$x = 1871$$

a loss of only 129 machines.

The following table summarizes the foregoing results:

		Group I				Group II			
		Initial Number, 2,000				Initial Number 1,000			
		Ability Ratio A B	Final No.	Lost Nos.	Lost % loss	Time	Final No.	Lost	Lost
Case	I	1 to 2	1,413	587	29.4	.881	0	1,000	100%
Case	II	2 to 3	1,581	419	21.0	.713	0	1,000	100%
Case	III	1 to 1	1,732	268	13.4	.550	0	1,000	100%
Case	IV	3 to 2	1,826	174	8.7	.433	0	1,000	100%
Case	V	2 to 1	1,871	129	6.5	.370	0	1,000	100%

The curves, delineated in the accompanying figure, show how the numbers fall off in the two groups after fighting begins. The curves belonging to group A, cease to have any meaning as soon as the corresponding curve of group B reaches zero.

This table shows conclusively that numerical superiority is the controlling factor in every case considered even with the quality factor against it. The first case is especially interesting in this respect where a number of machines fighting one-half that number but of twice the quality win out with a loss of 30% as compared with 100% in the smaller group. With these equations it is, of course, possible to calculate the advantage to be derived by separating by superior strategy, the equally numerous enemy group into two groups and separately annihilating them.

For example a force x of 1000 meets separately a force y of 500. The result is that the 500 are destroyed with a loss of only 134 in the x force. This leaves 866 x forces opposed to 500 new y forces which they can destroy with a loss to themselves of only 159 more, making a total loss in the x forces of only 293 against 1000 enemy forces.

Consider two unequal groups a and b and let us deduce the relation that must exist between the quality factors A and B, so that both groups lose simultaneously all of their machines, *i. e.*, 100% loss.

The general equations give for this supposition

$$0 = b \cosh T - Aa \sinh T$$
$$0 = a \cosh T - Bb \sinh T$$

where T is the time at which this occurs and the ratio of $\frac{B}{A}$ is to be determined. By dividing one equation by the other, we get immediately

$$\frac{B}{A} = \frac{a^2}{b^2} = \left(\frac{a}{b}\right)^2$$

In other words, in order to overcome a numerical superiority ratio $\frac{a}{b}$, the smaller group must have a quality better than the larger group as the square of that ratio. Specifically, to overcome a twice larger group, the quality of the smaller must be four times that of the larger. A superiority in numbers of three would require a quality superiority of nine and so on.

Lanchester's demonstration of this principle, which he calls the n^2-law is very neat and is given below. Our demonstration makes it a special case of the general integrated equations.

His assumption is that if two forces are engaged, their *relative* strength is unimpaired if the same fraction of both is simultaneously put out of action, that is

$$\frac{\frac{dx}{dt}}{x} = \frac{\frac{dy}{dt}}{y}$$

which, together with

$$-\frac{dx}{dt} = By \text{ and } -\frac{dy}{dt} = Ax$$

gives immediately $By^2 = Ax^2$

or, as he puts it, "the fighting strength of two opposing forces are equal when the products of the qualities of the square of the number respectively are equal."

The time T at which total destruction is completed is given by

$$\tanh T = \frac{a}{Bb} = \frac{b}{Aa}$$

Here, of course, it is necessary to know the absolute quality in order to compute specifically the time, but if the quality ratio is as stated above, both groups will eventually completely destroy each other.

It is of some interest to determine what the quality ratio should be in order that when the weaker group is annihilated, the stronger shall have lost the same number of machines.

The conditions for this case are, that when

$$b = T \qquad x = a - b \qquad y = b - b = 0$$

The equations become

$$a - b = a \cosh T - Bb \sinh T$$
$$0 = b \cosh T - Aa \sinh T$$

From the last we get

$$\tanh T = \frac{b}{Aa} = \frac{ABb}{Aa} = \frac{Bb}{a}.$$

From the second

$$\frac{a-b}{a} = \cosh T - \tanh T \sinh T$$
$$= \frac{\cosh^2 T - \sinh^2 T}{\cosh T} = \frac{1}{\cosh T}$$

so that $\cosh T = \frac{a}{a-b}$

Since $1 - \tanh^2 T = \frac{1}{\cosh^2 T}$ we get, calling $\frac{a}{b} = Z$ the odds,

$$\frac{B}{A} = (2Z - 1)$$

So that, if the odds are 2 to 1 against the smaller group, it will, nevertheless, inflict an equal loss on the larger group if its quality is three times

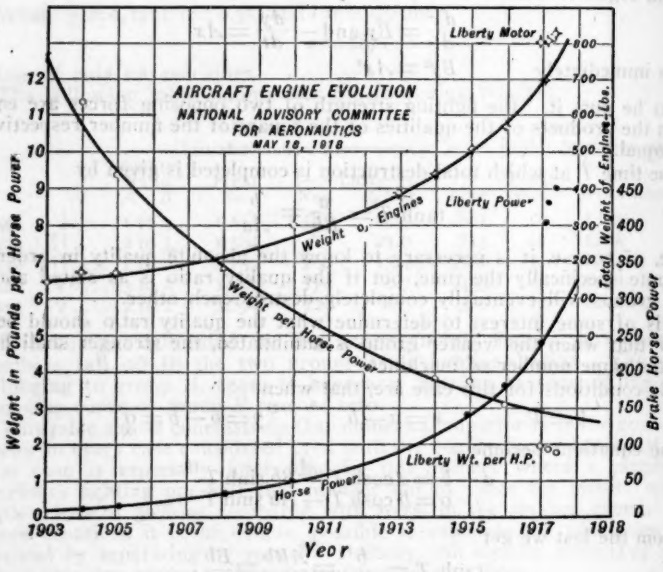
that of the more numerous group; if the odds are 3 to 1, it must have a superiority of quality 5 in order to destroy an equal number of machines.

This case shows the conditions necessary where inferior machines are sacrificed for an equal number of better quality.

Although the treatment of the subject is slightly different from that of Lanchester, no claim of originality is made by the writers of this article who will feel gratified if it will attract attention to the fact so clearly brought out that "numbers" certainly do "count."—*Aviation*, 15/6.

EVOLUTION OF THE AIRPLANE ENGINE.—The War Department authorizes the following statement on the evolution of the airplane engine which has been prepared by the National Advisory Committee for Aeronautics:

The first man-carrying airplane flights were made in December, 1903, with the Wright Brothers' engine developing 12 horsepower and weighing



152 pounds, or 12.7 pounds per horsepower. In 1910, seven years later, the average horsepower of aeronautic engines had increased to 54 and the weight decreased to 5.7 pounds per horsepower. In another seven years, 1917, the average power output had advanced to 243 horsepower and the weight decreased to 2.8 pounds per horsepower. In March, 1918, the Liberty twelve developed 432 horsepower for a weight of 808 pounds, or 1.86 pounds per horsepower. At the present time, May, 1918, the Liberty twelve is yielding a maximum of 450 horsepower for a weight of 825 lb., or 1.83 pounds per horsepower.

The accompanying table and curve sheet show the advance in the average power-weight ratio by years for the engines in actual flying use. It is to be especially noted that the Langley-Manly engine, built in 1901, was nine years ahead of its time in the matter of power output and sixteen years ahead in its weight per horsepower.

In 1917, the Liberty "twelve" was 65 per cent more powerful and 28 per cent lighter per horsepower than the average in service for that year.

So far this year, these figures are probably changed to fifty per cent and 25 per cent respectively, which indicate the advance of the Liberty over the average engine in service at the present time.

AIRCRAFT ENGINE EVOLUTION

Name of Engine	Year	Horsepower	Weight (lb)	Weight per horsepower
Langley Manly Engine	1901	52	151	2.9
Original Wright Bros.	1903	12	152	12.7
Improved Wright Bros.	1904	16	180	11.4
Improved Wright Bros.	1905	19	180	9.5
Redesigned Wright Bros.	1908	35	182	5.5
Average on Market	1910	54	309	5.7
Wolseley Engine	1913	147	720	4.9
Average on Market	1914	112	437	3.9
Average on Market	1915	133	512	3.8
Average on Market	1916	185	570	3.1
Average on Market	1917	243	693	2.8
Liberty 12 cyl.	1917	400	801	2.0
Liberty 12 cyl. (March)	1918	432	808	1.9
Liberty 12 cyl. (May)	1918	450	825	1.8

The average consumption of fuel decreased from about .8 pound per horsepower in 1903 to about .65 pound in 1914, since which it has slowly dropped to .55 pound in 1918, and, for the Liberty to .50 pound. The present Liberty consumption is approximately .46 pound per horsepower-hour.

Illustrating the advance made, the Wolseley Company in 1913, could only obtain 147 horsepower at 1400 revolutions per minute from eight cylinders, five-inch bore by seven-inch stroke, or 18.375 horsepower per cylinder. This is the same size cylinder as used in the Liberty which now gives 450 horsepower, at 1800 revolutions, from 12 cylinders, or 37.5 horsepower per cylinder obtained in the Wolseley. Even if we reduce the Liberty results to the same speed as the Wolseley, that is, 1400 revolutions, the Liberty still represents a great advance, for at that speed 350 horsepower are developed, or 29.2 horsepower per cylinder. Moreover, the Wolseley weighed 4.9 pounds per horsepower as compared with 2.3 pounds for the Liberty at the same speed, or 1400 r.p.m.

[*Editor's Note.*—While the above statement is quite interesting it seems rather regrettable that the engines from which the "average on the market" from 1913 to 1917 has been compiled are not specifically mentioned, for this would greatly enhance the value of this table. One might also point out that the Wolseley engine, of which such a free use is made for purposes of comparison with the Liberty engine, cannot be called a representative of its period, for it was never currently employed on any type of airplane. One is also under the impression that the geared-down model of the Liberty twelve, developing 450 horsepower, was only an experimental type and will not be manufactured for use in service airplanes.]—*Aviation*, 15/6.

THE NEW GIANT GERMAN AEROPLANE.—The French aviation authorities recently announced officially that during the night of June 1-2, a giant enemy aeroplane provided with four motors and carrying a crew of eight men had been brought down near Nanteuille-Haudoin—about half-way between Soissons and Paris. Further particulars concerning this machine have been supplied by a correspondent on the French front. The machine is stated to be of the *Lisenz* model, but we accept this name with reserve,

as it is merely the German word for "license." The following numerical data are furnished by the correspondent:

Engines	Four of 300 horsepower.
Span of wings	141 feet.
Length overall	92 feet.
Weight, empty	20,300 pounds.
Weight, fully loaded	32,200 pounds.
Weight of bombs carried	4400 pounds.
Maximum speed	75 to 80 miles per hour.
Armament	Four machine guns.

The crew of eight apparently consisted of the pilot, an assistant pilot, two gunners and four mechanics.

It is of some interest to analyze these data as far as we are able, and to compare this new type of machine with the Gotha or Friedrichshafen bombing machines, the largest machines of which, hitherto, we have had definite information. We can assume, we think, that the engines are of the Mercédès 260 horsepower six-cylinder design, for it seems unlikely that the enemy has developed a new type of engine and applied it to a new type of aeroplane. The Mercédès engine of the model named consumes fuel and oil combined at the rate of 146 pounds per hour at normal speed. The crew can be reckoned at 180 pounds per head. The Friedrichshafen machine is provided with tank capacity sufficient for about 3¼ hours of flight at full speed, and usually carries a crew of three, although accommodation is provided for four. With these figures we get the following comparison of weights:

	Friedrichshafen pound	"Lizenz" pound
Weight, empty	5,929	20,300
Fuel and oil for 3¼ hours	948	1,806
Crew	540	1,440
Bombs	1,229	8,564
Total weight	8,646	32,200

It will be noticed that the weight of bombs carried by the new machine, according to this reckoning, is nearly twice as great as the figure named in the unofficial account. If the latter figure is correct, it would seem that the machine is provided with sufficient fuel and oil capacity for some 5½ hours' flight at full speed. It would thus appear to be capable of carrying nearly two tons of bombs to a point some 200 miles from its base and returning. The German aerodromes in West Flanders are about 140 miles from the center of London, as the crow flies. Hence the new machine has been designed, it might be presumed, not to bring new regions within the range of aeroplane attack, but, primarily, to enable bombs of greatly increased weight to be dropped on the targets already reached by the Gotha and Friedrichshafen.

We do not know what the speed of the Gotha is, but it is obvious that it must, in order that the machine may be able to bomb London and return within three hours, be at least 100 miles per hour. It will be seen, therefore, that by doubling the power and by being content with a materially lower speed the enemy has nearly quadrupled, in the new machine, the weight of bombs carried. To obtain the increased lift, it is not, of course, sufficient merely to increase the power; the size of the machine, as a whole, must also be increased. The span of 141 feet in the new machine compares with 78 feet in the Friedrichshafen, and the overall length of 92 feet with 42 feet. Thus the actual area of the target presented by the machine is approximately four times as great as in the case of the Friedrichshafen. This figure has, further, to be multiplied by some factor greater than unity, in order to allow for the effect which the reduction of the speed has on the probability of successful attack by gun-fire.—*The Engineer*, 14/6.

MERCHANT MARINE

BUILT WITHOUT RIVETS.—*Steel Vessel Just Launched Was Welded Together.*—The first steel vessel built without rivets, so far as known, has just been launched on the south coast of England. The production of this vessel, it is considered, may mark an epoch in shipbuilding, the plates being fused together by electric welding in one process. General adoption of this process, it is held, would speed up production, with an estimated saving of from 20 to 25 per cent in both time and material.

The United States Shipping Board, it is understood, has been in close touch with the experiment, with the result that arrangements are said to be in hand for building of a number of 10,000-ton standard ships after this plan. Under the new method of construction, the riveters become welders.—*The Baltimore Sun, 17/7.*

GOVERNMENT FINDS NEW COATING FOR CONCRETE VESSELS.—Concrete vessels which the Emergency Fleet Corporation is building will be as durable as steel vessels, according to R. J. Wig, chief engineer of the Concrete Ship Division of the Fleet Corporation. One of the chief objections entertained against the concrete vessels has been the charge they will disintegrate in seawater.

"From our comprehensive tests of concrete structures at seawater," said Mr. Wig to-day, "We are assured that concrete ships will last a minimum of several years without any protection whatever. By the application of protective coatings which are well known to us, we are certain of an extended life of several years additional. And with the further development of protective means upon which we are now working, I believe the concrete ship can be made as permanent as steel, if not more so.

"Few people realize that the concrete ship is actually 20 per cent lighter than the wood ship, if built of a new concrete mixture developed by the Emergency Fleet Corporation. The aggregate from which this new concrete is made is so light that it floats on water and yet it makes a kind of concrete possessing twice the strength of that used in ordinary building construction. With this development the concrete ship will come into more direct competition with steel ships."—*N. Y. Herald, 9/7.*

BUILDING OF WOODEN SHIPS UP TO 1,000 TONS NOW IS URGED.—Further stimulus for the nation's shipbuilding industry was given to-day in a resolution adopted by the Shipping Board to encourage a revival of the building of small wooden ships. The resolution says:

"The board will encourage the building of wooden sailing vessels or motor driven vessels, either for private American account or foreign account up to 1000 tons deadweight, provided such buildings receive the approval of the Fleet Corporation as a manufacturing proposition; and provided that the transfer of the flag will be agreed to by the board when the ship is ready for delivery; it being understood that the vessel will be free of requisition during construction. Should military necessity arise, however, the board reserves its right to commandeer all such vessels."

The board also made public a resolution affecting vessels still undocumented under the American flag, as follows:

"As to undocumented vessels which are not otherwise within the provisions of the act, the board will cause broker licenses to be withheld unless these vessels are documented under the American flag and owned by American citizens or American corporations, the majority of whose capital stock is owned by American citizens."—*N. Y. Herald, 15/6.*

WILL BUILD IN NUMBERS LARGE WOODEN SHIPS.—The largest wooden ship ever built is soon to be turned out in numbers by the Shipping Board. It will be a new model 5000-ton standard type, adapted from the 4700-ton boat now being built, which was originated at Orange, Texas.

Numerous changes in the design have been made by naval architects to avoid troubles encountered in previous projects, especially the use of tim-

bers so large that they cannot be obtained anywhere except in the giant forests of the Pacific coast. All timbers needed for the new ships will be available in the pine forests of the south.

Machinery ordered for the 3500-ton wooden ships, which were the first wooden ships ordered by the board, is to be utilized in the new vessel, and many of the details and the fittings on the former will be employed on the larger design to facilitate construction.

Following the Shipping Board's decision to use the majority of wooden ships in the coastwise trade, it has been decided to construct the new vessels so that they may be able to tow barges, in order to get the maximum of carrying capacity. Plans are being completed for the building of a fleet of 2500-ton towing barges.

Plans for Steel Steamers.—Plans for new steel steamers announced to-day contemplate the purchase of 100 electrical propelling sets, suitable for large size cargo steamers and of the type found satisfactory in naval vessels. This is an innovation in merchant ship construction.

The problem of obtaining men to act as electrical engineers on the vessels has been solved by the decision to ask for the services of experts of big power plants throughout the country.—*Evening Star*, 24/6.

EMERGENCY FLEET ENGINES.—In view of the great interest naturally felt by American engineers in propelling machinery of the Emergency Fleet ships, there is reproduced on the opposite page from *Power* a cut showing the general arrangement of the fore-and-aft triple-expansion engine built for the corporation by the Buckeye Engine Company.

It is of 700-horsepower capacity and has a 15½-inch diameter high-pressure cylinder, a 26-inch intermediate and a 44-inch low-pressure cylinder with a stroke of 26 inches. Piston valves are to be used on all cylinders and are 7⅞, 14⅛ and 15 inches in diameter, respectively, and 3 feet 11 inch long.

The columns on which the cylinders are secured are 7 feet 1 inch high and 7 feet wide at the base. The frame consists of a front and back column. The front column is 4½ inches in diameter and the back column is of A-shaped form when looked at from the forward end. These columns carry the guide bars.

The crankpins are 8½ inches and the wristpins 4½ inches in diameter. The shaft is 8⅜ inches in diameter and the cranks are placed at 120 degrees apart. (*Power*, vol. 47, No. 23, June 4, 1918, pp. 794-795, 2 figs., *dA.*)

SNELL SYSTEM OF ELECTRIC PROPULSION FOR SHIPS.—The Snell system of electric propulsion is to be used in particular for ships operating under such conditions that the time of loading and unloading is considerably greater than the time during which the ship is under way. This applies in particular to cross-channel navigation.

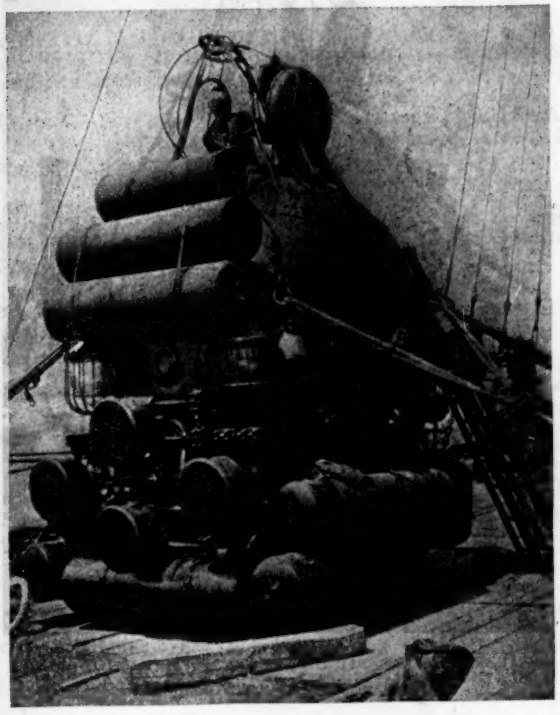
Instead of a complete set of machinery in each ship, the Snell system provides one set of transferable power-producing machinery so constructed as to be attachable to several independent hulls. Only propellers and electric motors, which form a small proportion of the total cost of machinery, are fixed in the hulls themselves and are connected during the voyage to the power-producing machinery by electric cables.—*Jour. of Am. Sc. of Mechanical Engineers.*

MISCELLANEOUS NOTES

A SUBMARINE FOR RAISING SHIPS.—Some three years ago there appeared in these columns a story and photographs of a proposed spherical car for deep-sea salvage work. At that time the inventor, Mr. William D. Sisson, of Los Angeles, Cal., had not as yet put his idea into practice, except to the extent of building a small machine. But the idea, novel as it was, appealed to the scientific world. Again the subject is brought to the fore,

this time because the inventor has constructed a large machine which is now ready for actual work.

Briefly, Mr. Sisson's machine is a deep-sea spherical submarine with a steel shell several inches in a thickness to resist tremendous pressures. It is provided with two propellers and a rudder, permitting of such travel as is possible with a craft connected by chains and cables to a tender riding on the surface. The tender supplies the submarine with electric current for driving all the machinery and for furnishing illumination both inside and out. Telephones are provided for intercommunication between tender and submarine.

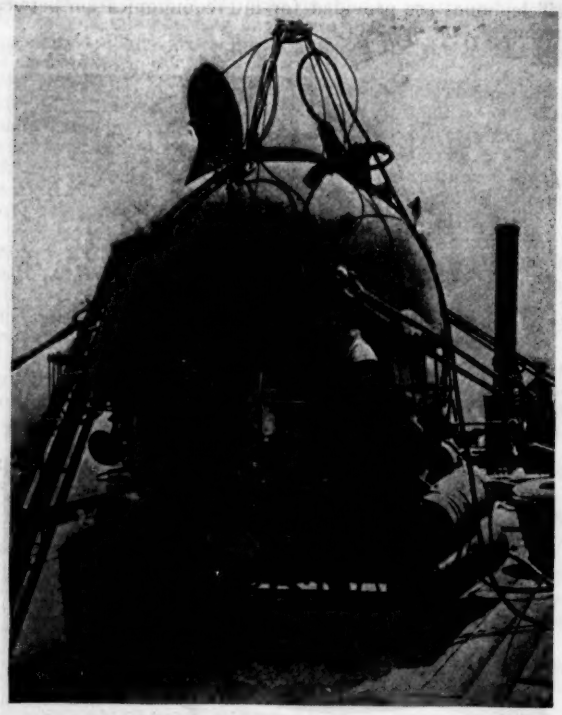


FRONT VIEW, SHOWING ELECTRO-MAGNETS AND DRILLING MECHANISM.

The submarine, which is equipped with many external devices including four powerful electromagnets and a drill, operates in about this manner: When the scene of the wreck is reached, the submarine car is lowered at the approximate spot so that it can explore about until the wreck is definitely located. Then the submarine ascends only to return with a corrugated steel pontoon, which is equipped with an electrically-driven pump. The pontoon, which is provided with a long steel cable, is filled with water so as to sink all the more readily.

In the case of steel hulls the submarine can fasten on to the plates by means of its electromagnets. Then an electrically-driven drill mounted in the center of the group of electromagnets is brought into action, boring

a large hole in the hull of the sunken ship. With the same magnetic grip the submarine can be slightly shifted by a gear arrangement so as to drill more holes. An ingenious external arm permits the cable of the pontoon to be passed through these holes, thus affording a sure fastening. When a sufficient number of pontoons have been attached to the vessel, the electric pumps in those steel cylinders are started, forcing out the water and restoring their buoyancy. Slowly but surely the ship is raised to the surface; meanwhile, the operation can be supervised by the submarine



REAR VIEW OF THE SALVAGE SUBMARINE, SHOWING RUDDER AND PROPELLERS.

crew peering through thick glass windows and directing the tender crew by telephonic means.—*Scientific American*, 22/6.

CURRENT NAVAL AND PROFESSIONAL PAPERS

UNITED STATES

SEA POWER. **July 1.**—The U-Boat in American Waters (illustrated) by *Herbert F. Hill.* The Growth of the Marine Corps, by *Archibald Henderson.*

SHIPPING. **July 6.**—Ship Rationing at U. S. Ports, by *C. H. M. Jones.*

SCRIBNER'S MAGAZINE. **July.**—The United States Naval Academy, by *C. H. Foster.* National Righteousness and Japan, by *Barrett Wendell.*

TIMES CURRENT HISTORY. **July.**—The Battle of Jutland, by *Admiral Cyprian Bridge* and others.

FLYING. **July.**—Flight Across the Atlantic, by *Major General William S. Brancker.* Chart of Winds Across Atlantic, by *Prof. A. L. Rotch.*

MARINE ENGINEERING. **July.**—Production of Propelling and Auxiliary Machinery for Emergency Fleet must be speeded up.

MARINE ENGINEER AND NAVAL ARCHITECT. **June.**—Corrosion of Marine Boilers.

INFANTRY JOURNAL. **July.**—Demobilization, by *Major John R. M. Taylor.* General Staff Field Exercises, by *General von der Goltz.* Personnel, by *Major General R. Hutchinson,* British Army.

MARINE CORPS GAZETTE. **July.**—The Royal Marine Brigade at Antwerp, by *Col. C. Field.* Camp Sanitation in Trench Warfare (from Military Surgeon, Dec., 1917).

GREAT BRITAIN

NINETEENTH CENTURY AND AFTER. **June.**—The Raids on Zeebrugge and Ostend: A New Precedent in Naval Warfare, by *Staff Paymaster Cyril Cox, R. N.* War Aims—True and Spurious, by *George A. B. Derrar.*

FORTNIGHTLY REVIEW. **June.**—Zeebrugge and Ostend—and After, by *Archibald Hurd.* The Root Causes of Russia's Collapse, by *E. H. Wilcox.* Holland's Inevitable Decision, by *" Y."*

LAND AND WATER. **June 20.**—Germany's Lost Illusions, by *Arthur Pollen.*

CONTEMPORARY REVIEW. **June.**—Sea Power Wins, by *Admiral Penrose Fitzgerald.*

JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION. **May.**—Extracts from the Diary of an Officer of the *Koenigsberg.* British Sea Power and International Law, by *T. Milles Majuine.*

CONTINENTAL EUROPE

RIVISTIA MARITTIMA (ITALY). **March.**—The Problem of the Hydroplane, by *Engineer A. Guidoni.*

APRIL-MAY.—Scout Cruisers, by *Lieut. Umberts Monico.*

Courtesy *New York Tribune-Graphic*

"We Have Answered His Hate with the Searching Bomb."

INTERNATIONAL NOTES

1. Naval War Notes 1909
2. Diplomatic Notes 1952

NAVAL WAR NOTES

PREPARED BY

Lieutenant W. B. Jupp, U. S. Navy

Strategy 1909
Lessons of the War 1921
Naval Operations:
- Atlantic 1929
- North Sea and Channel 1936
- Baltic and Kattegat 1942
- Mediterranean 1942
- Adriatic 1942
- Black Sea 1943
- Pacific 1945

General Notes:
- U-boats and Shipping 1945
- Military 1950

Index of War Vessel Losses, This Number 1951

Correction to legend under picture of *U. S. S. Manley*, facing p. 1353, June issue. The commanding officer of the *Manley* was not killed or injured in the accident to his vessel.

STRATEGY

The Naval Situation.—In conjunction with the German offensive by land, many believe that the Germans are ready to attempt a great naval offensive. However, there is no evidence that the Germans are preparing to send out their fleet. Such action seems improbable since the Allies have become so strong through the arrival of American units, including a large number of destroyers. It is felt that the Germans would surely lose and then would be at the mercy of an Allied landing.

The forces of the Allies on the sea are working in as perfect harmony as they now are on land and there is no opportunity to catch the staff unprepared. It is more probable that the Germans are ready to conduct other forms of naval warfare by means of auxiliary submarines and raids by cruisers and destroyers accompanying mine draggers in an effort to clear mines from the channel along the Belgian coast and in the North Sea. They may also send a Corsair cruiser into the Atlantic in an effort to aid the submarines operating spasmodically in mid-ocean and on the American coast.

It is reasonably certain that the Germans intend to concentrate their efforts upon their present method of submarine warfare, maintaining U-boats now in the Mediterranean, now in the North Sea, now on the French coast, now west of Ireland and now on the American coast, depending upon the information as to ocean traffic and also in an effort to scatter

the Allied anti-submarine forces. The Germans recently have been operating largely in the Mediterranean. It is easier for the U-boats to leave Pola and Cattaro than German ports.

To-day the submarines are very inactive, due to the ideal summer conditions for hunting the enemy. Few ships are being torpedoed and no mines are being laid. This is no reason for ceasing preparations to combat the U-boats, since things change quickly on the sea. At any moment the Allies may need an abundance of good weapons. Valuable cargoes are still being lost. The price of the assurance of the safe arrival of American troops consists in unrelenting vigilance and constant preparedness.

Rumors About German Fleet.—The rumors that the German fleet is coming out may be caused by the great desire of the Allied Navies that it should do so. The only way to make it come out, it is believed, is to bomb the enemy bases from the air until it is safer to come out than to remain in harbor. The place for a start is the Adriatic.—*Washington Evening Star, 21/6.*

THE WAR AT SEA.—Perhaps the most telling commentary on the German claim that they cannot find the British Fleet is in the Admiralty announcement made this week, that on the second anniversary of Jutland numerous anti-submarine and escort patrols were carried out in home waters, and long reconnaissances were made across the North Sea. That is fact. The stuff the Huns throw to the winds from their wireless stations is fiction. There are yet some people who appear to think that because the Allies do not or cannot force a naval battle on the enemy, therefore our fleets are not accomplishing their work to the fullest extent. Such people have no knowledge of the naval history of their country, and they fail to appreciate what naval work is and what is expected of our seamen. Lord Jellicoe once said, that it was the business of the navy to keep the ring, or, in the language of the boxing contests, to see fair play between the combatants actually engaged inside the ropes. This, indeed, is one of the duties of the navy, but it is far from being all or the greater part of that which it is called upon to do.

It is essentially the function of the fleet to destroy the naval forces of the enemy, but with this object in view unnecessary risks will not be taken by wise and experienced commanders. Certain advantages accrued to us from the battle of Jutland, and it would be most injudicious, and perhaps suicidal, to throw these away. That battle was not fought under such conditions as we should have chosen ourselves. The next battle at sea should be. The Germans have been forced into a position from which, if they elect to fight again, they must come out and do so in the circumstances we choose. All that has happened since the battle was fought has been making towards this result. If they had believed the battle of Jutland to be a real victory, or to point to the probability of their achieving a victory, they would not have allowed two years to elapse without an attempt to repeat it. What they really did was to substitute for a settlement of the question of superiority by a fleet action the unlimited submarine warfare which they have now come to regard as a failure. In the meanwhile the movement of their fleet in the North Sea has been restricted by mines; by sea and air our scouts carry on upon the fringes of their protected waters, and our convoys pass virtually unmolested across the North Sea. They may be obliged to make another effort to dispute the sea supremacy, but if they do it will be in even more disadvantageous surroundings than was the case two years ago.

Rear Admiral Gleaves, who is at the head of the American transport and cruiser operations, made an interesting statement recently which has an important bearing upon the question of possible German activity in the North Sea. He repeated the statement made by Secretary Daniels, in April last, that more than 150 vessels and between 35,000 and 40,000 officers and men of the United States Navy are now in European waters, and added

that the navy itself, so far as the *personnel* is concerned, had been quadrupled since the war began. Of this large force and its potential reserve a squadron of battleships under the command of Rear Admiral Hugh Rodman is with Sir David Beatty, and this squadron can be added to if it should be deemed necessary to increase the battleship force which is at present watching the High Sea Fleet, prepared to pounce upon it at short notice. The spirit of co-operation which inspires the officers and men of the British and American navies was referred to not long since in an exchange of messages between the First Lord and Mr. Daniels, and Admiral Sims in an interview insisted that for the word "co-operation" that of "consolidation" might well be substituted. A bright spot in the tragedy of this war, wrote Mr. Daniels, is the mutual appreciation of the men in the two naval services, and Sir Eric Geddes, in reply, testified also to the cordial relations which existed between the two navies. Here there is a guarantee not only of the effectiveness of the team work which is being carried out in the battle fleets, but of the good results which may confidently be expected therefrom should it be put to the test of battle.

It is not alone in the naval unity of the Allies or in the accession of strength given by the American ships that the force under Sir David Beatty ready to meet the High Sea Fleet has been considerably strengthened during the past two years. In what respect, then, it will be asked, have the Germans utilized this period to increase their naval power against the day when it may have again to be tried in conflict? In actual material their squadrons have been added to by ships completed since July 1, 1916, but to no great extent. Nothing, indeed, to compare with what has been added on the other side. Nor is it likely that in the ships of the Russian Baltic Fleet so far, at all events, as the larger units are concerned, can they hope for any large increase in numbers or power. In the first place the Russian ships are in no state for immediate use and, again, there may yet be patriotism sufficient in the remnants of the Russian Navy to prevent their being used by the Germans.

It is quite well in this connection to consider the remarks of Captain Persius, perhaps the most judicious and probably the best informed of the German naval writers. He certainly does not share the view of his master, the Admiral of the Atlantic, that "the nimbus of British sea supremacy has been forever destroyed." On the contrary, although he speaks of the success of the German Fleet at the battle of Jutland (success, we may suppose, in escaping without worse loss), he is unable to see that it brought about any change in the situation in the theaters of war. He points out to his countrymen that the British mercantile flag is not banished from the seas of the world, and he might have added that, in spite of the "U" boat menace, thousands of our ships and those of our allies continue to cross the seas, and thousands of troops are carried across the oceans with scarcely any loss whatever. That would be, indeed, strange if British naval domination had been completely shaken, or if it were likely that a second battle of Jutland would succeed in bringing about the consequences, claimed in Germany for the first.

Captain Persius' comment on the story of Jutland so far as it has yet been told, is a warning to his countrymen not to expect very great things even if the High Sea Fleet should put out again. This is what he says:—"To-day, on the anniversary of the battle of Jutland, it is opportune again to realize how seriously Great Britain is to be taken as an enemy. She has never yet lost a war. She has triumphed at the end of every campaign. She is now sacrificing blood in streams." He speaks also of the displeasure and indignation felt by many German seamen at the boasting which appears in the German press, for they know that if another sea battle should occur all their skill and strength will be needed even to secure a drawn battle. It is more than likely that the situation may presently assume such a character that it will oblige the Kaiser or his military advisers to send the fleet

to sea as a gambler's last throw. But if used in this way the foreboding which Captain Persius put into words will probably cause the issue of the fleet to be but one of a series of actions in which other forces will take part and in connection with which the sea battle will be merely an incident.—*Army and Navy Gazette*, 8/6.

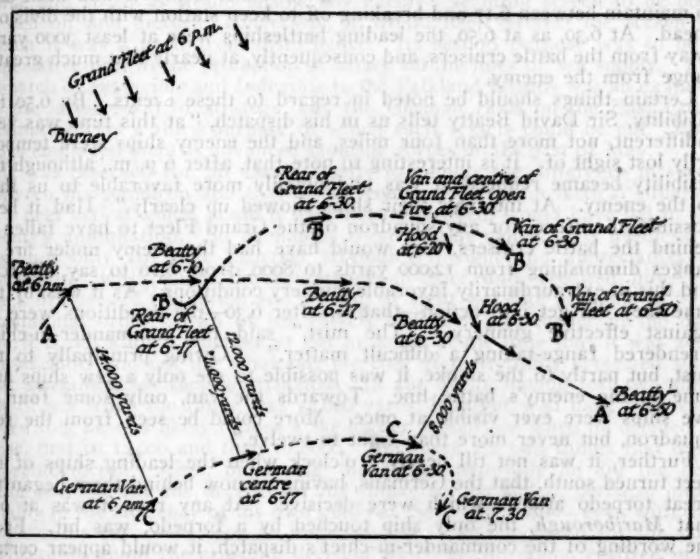
THE JUTLAND ANNIVERSARY.—By A. Pollen.—In dealing with the anniversaries that fell last week, I intended—but space forbade—touching on the aspect of the Battle of Jutland which has not yet, I think, been discussed, and, in making notes for it, read through with great interest Mr. Ourd's chapter on the battle in his recently published work. The author writes with enthusiasm and a literary skill which makes it contagious. It is refreshing and comforting to have the story of the sea war retold to us with the ring of victory in every line. And behind it all there is an apostolic purpose worthy of the theme. Mr. Hurd's motive in writing is to make the world's debt to the British Fleet so patent an affair that, when all is over, we may ever continue to hold the navy's work in grateful memory. But, greatly as I desire the end this very engaging writer has in view, I am far from sure that, in adopting the method of indiscriminating praise, he has chosen an effective means for securing it.

For really, when it comes to our North Sea strategy, to Jutland, to the submarine campaign, and for that matter every other aspect of our naval policy, our author will have it that, from 1914 till 1917, our course was a continuous miracle of perfection. The author clearly has no doubts at all. There is nothing Lord Fisher planned that Nelson would not have endorsed; there is no course of Lord Jellicoe's that the greatest of all seamen would not have been proud to follow. Some critics, he tells us, have asserted that had true doctrine been acted on, the German fleet would have been destroyed and the submarine peril removed. "It may be argued," he says, "that Nelson would have gone into the German ports in spite of all risks and attacked the German fleet in its nests." Heaven forbid that anyone should prescribe limits to the nonsense that "may" be argued. But surely it is a simple fact that no one of sense ever has so argued, and that the lament over the survival of the German fleet was occasioned, not by failure to attack it at anchor, but by its unfortunate escape on May 31 two years ago. Curiously enough, while Mr. Hurd mentions six comments on the famous battle—none of which he tells us has stood the test of time—he entirely omits to mention the master issues raised. First, does the threat of torpedo attack constitute that superior force in the presence of which alone a British admiral is justified in retreating? Secondly, why, as the rear battle squadron got into action at 6.17, did not the leading divisions open fire before 6.30?

Policy and Organization.—The book, it seems to me, would have been more useful if it had dealt with these and other naval issues with greater frankness. Every one who writes about war during war is necessarily in a dilemma. He must be on his guard not to help the enemy. It is his duty to encourage as well as to inform his readers. With the splendid spectacle which the valor, the self-sacrifice, and the devotion to duty which the British on the sea have shown in the last four years, he would have to be a poor spirited creature indeed, not to be in a constant temptation to dwell only on the greatness of what he describes, and to deal with the men and the measures they adopt in terms of praise alone, and of superlative praise at that. But surely those who have made a special study of naval war are at times justified in pointing out where policy is weak, or preparations inadequate, or organization defective. Our government which runs the war is, after all, civilian. It is civil opinion in the end that alone can secure right military action. The fact that we have completely changed our naval policy, by changing the organization that creates and controls it, seems by itself to prove that criticism has been neither merely destructive nor altogether without valuable results. And to acknowledge

our great defects of organization does not belittle but enhances the great things the seamen have done.

A Problem in Deployment.—If the views set out above are sound, it is no disservice to the general cause to make, from time to time, a careful and dispassionate examination of past events because, though it is exceedingly unlikely that the conditions arising in one action will be reproduced, even approximately, in another, still an inquiry may exhibit a principle in working that will assist towards its better future application. With this object in view I propose to examine one of the two main issues arising out of the battle fought two years ago. The first of them, which may be called the torpedo problem, has perhaps been as adequately discussed as the information at our disposal makes possible. But the second raises questions to which much less consideration has been given. Let me recall the broad facts of the situation between 6 and 6.50 p. m., of which a rough indication is set out in the diagram.


Grand Fleet at 6 p.m.
Burney
Rear of Grand Fleet at 6-30
Van and centre of Grand Fleet open fire at 6-30
Hood at 6-20
Van of Grand Fleet at 6-30
Beatty at 6-10
Beatty at 6 p.m.
Beatty at 6-17
Hood at 6-30
Van of Grand Fleet at 6-50
Rear of Grand Fleet at 6-17
Beatty at 6-30
14,000 yards
12,000 yards
8,000 yards
Beatty at 6-50
German Van at 6 p.m.
German centre at 6-17
German Van at 6-30
German Van at 7.30

We know from the dispatch that the Grand Fleet was coming down to the battlefield on a SE. by S. course, in six divisions, with the first squadron, under Admiral Burney, on the western flank About a mile would separate the divisions from each other. At four minutes to six, *Lion* and *Marlborough* saw each other at a distance of between ten to eleven thousand yards. At that time the head of the German line was 14,000 yards from Sir David Beatty, bearing approximately as indicated. Beatty, it will be remembered, changed course to the east and went full speed. He sighted Admiral Hood with three battle cruisers at 6.20, ordered Hood to take station ahead of him, and changed course at 6.25 in support. Hood was then closing on to the German van, and firing at a range of 8000 yards. Beatty apparently kept this course until approximately 6.50, having thrown the head of the enemy line into complete confusion.

In the meantime at 6.17 the western divisions of the Grand Fleet—which were to become the rear when the single line was formed—had come into action at a range of 11,000 yards. These ships must, therefore, have crossed Sir David Beatty's track at a point about three and a half to four miles astern of him. They accordingly got into action at once, probably

with the German center. The rest of the Grand Fleet did not open fire on the main force until 6.30, by which time, if the line was formed, they would have been approximately in the position shown in the sketch. For at 6.50, Sir David Beatty tells us, the battle cruisers were clear of the Grand Fleet, the leading ships of which "bore NNW. from him at a distance of about three miles." In the sketch I have shown Beatty's course "*AA*," the German course "*CC*," and have indicated the line "*BB*" to show successive known positions of the Grand Fleet.

Now the point on which we are absolutely ignorant is how the Grand Fleet got from its original position at 6 o'clock into one which it apparently held at 6.30, when it opened fire. What seems to be quite clear is that, though the rear of the line must have crossed Sir David Beatty's track, it was not on the battle cruisers, nor the enemy's van, that the fleet deployed. The result was that between 6.10, when Sir David had closed the range to 12,000 yards, until bad light made gunnery impossible, he was unsupported, except by whatever period of fire *Marlborough* and her consorts had been able to maintain between 6.17 and breaking off to keep station with the divisions ahead. At 6.30, as at 6.50, the leading battleships were at least 3000 yards away from the battle cruisers, and consequently, at nearly that much greater range from the enemy.

Certain things should be noted in regard to these events. By 6.50 the visibility, Sir David Beatty tells us in his dispatch, "at this time was very indifferent, not more than four miles, and the enemy ships were temporarily lost sight of. It is interesting to note that, after 6 p. m., although the visibility became reduced, it was undoubtedly more favorable to us than to the enemy. At intervals their ships showed up clearly." Had it been possible, therefore, for any squadron of the Grand Fleet to have fallen in behind the battle cruisers, they would have had the enemy under fire at ranges diminishing from 12,000 yards to 8000, from 6.10 to say, till 6.40, and this in extraordinarily favorable gunnery conditions. As it was, by the time they did get into action—that is, after 6.30—the conditions were all against effective gunnery. "The mist," said the commander-in-chief, "rendered range-taking a difficult matter." "Owing principally to the mist, but partly to the smoke, it was possible to see only a few ships at a time in the enemy's battle line. Towards the van, only some four or five ships were ever visible at once. More could be seen from the rear squadron, but never more than eight to twelve."

Further, it was not till nearly 7 o'clock when the leading ships of the fleet turned south, that the Germans, having us now behind them began the great torpedo attacks which were decisive. At any rate it was at 6.54 that *Marlborough*, the only ship touched by a torpedo, was hit. From the wording of the commander-in-chief's dispatch, it would appear certain that it was now that the enemy's plans of evasion—torpedo volleys and smoke screens—were put in force. "After the arrival of the British battle fleet," says the commander-in-chief, "the enemy's tactics were of a nature generally to evade further action, in which they were favored by the conditions of visibility." "(He) constantly turned away and opened the range under cover of destroyer attacks and smoke screens, as the effect of the British fire was felt."

There was evidently something, then, in the situation or in the way it was met, that saved the German fleet from our gunfire, just at the one period when it could have been made really destructive. That the rear got into action before the van, is in itself an extraordinary circumstance, and it seems plain that, to take a numerous fleet into action in single line, presents difficulties to-day as acute as they were in the era of masts and sails. This fact is worth emphasis because the evolution of the Nelsonian battle is easily traced. The things that distinguish it from so heart-breaking a fiasco as Mathews' action, Byng's, or the Battle of the Saints, on the one hand, and the "Glorious First of June" on the other, were twofold. First, the tactical plan was made with the single object of bringing the force into

battle with the utmost rapidity, which involved it being directed straight at the points chosen for attack without preliminary maneuvers; and, secondly, the execution of the plan, after the commander-in-chief had made absolutely certain that his second in command and every subordinate had mastered his intentions completely, was left to the untrammelled discretion of these responsible for the separate divisions.

Battle Cruisers in Action.—The fact that Sir David Beatty was not supported at this critical period does not, of course, give rise to the assumption that he might and should have been. Until all the circumstances are known, any such inference from the bare facts should be unwarranted. But it remains a poignant regret that the support could not be given, for, viewed as a move taken with the expectation of such support, the vice admiral's tactical decision at 6 p. m. was of an exceptionally brilliant order. When the battle cruiser type was first designed, its purpose was announced to be twofold. It was to be a ship that would combine such force and speed as would enable any enemy's scouting screen to be both driven off and pierced; conversely, it would itself protect the screen of which it was a part, from disturbance. Its second purpose was to be a superlative unit in the protection or attack on the lines of sea supply. The dispatch of *Invincible* and *Inflexible* to the Falkland Islands was an example of the latter form of strategy, and the German raids on the East Coast exemplified yet a third purpose to which such vessels could be put. Both sides employed them as advanced scouting forces on the 31st of May.

It was reserved for Sir David Beatty to employ the difference in speed between his squadron and that of the enemy to create a tactical situation in a fleet action which, could it have been improved, would have led to the enemy's annihilation. So to employ these vessels called, it is needless to say, not only for that "correct strategical insight and appreciation of situations." with which the commander-in-chief duly credited him, but for a firmness of resolution and a grasp of right war-like principle of very exceptional order. Two of his vessels had been lost earlier in the day, and it is not known whether or not he knew at the time that it was accidental shots and not the wholesale piercing of their thinly protected sides that accounted for their destruction. In any event, having lost two ships out of six when the range was 14,000 yards, it might well have been supposed that he was likely to lose a far higher proportion when he decided to close, first to 12,000 and then to 8000. But there are two things that must be remembered. First, in closing the range materially he did the best thing possible for the defence of his ships; for he added, perhaps, incalculably to the efficiency of his own gunfire. Secondly, while—even with this point in his favor—he took an immense risk, it was incurred for the sake of bringing about the crushing decision which he, no doubt, realized must be obtained in the next half hour or probably not at all.

To those who are conversant with the discussion that followed, the two knot increase in speed which *Dreadnought* possessed over the *King Edwards*, this episode of crumpling the head of the German line is exceedingly interesting. It was made possible by the possession, not of a 10 per cent, but of a 30 to 40 per cent superiority in speed over the opposing force. For a parallel to it we should have to go a long way back in history. Possibly there would be no precedent at all until we come to the work of the high speed triremes of the Athenians and the victories which their superior oarsmanship obtained in the Peloponnesian war. In strict analysis this startling use of the battle cruisers was a containing movement. It was the essence of the Beatty stroke that it created the opportunity for the main fleet.

Indeed, is not the revolution at Whitehall itself the most astonishing of all the things the navy has done? It was effected at the most critical period of the war, despite exhortations not to swap horses in mid-stream. It is not our least conspicuous nationality to fear theory, to dislike order, and to distrust system. And this is seemingly an old trait. Shakespeare

must have had the opponents of the staff system in mind in writing Ulysses' speech in *Troilus and Cressida:*

> They tax our policy and call it cowardice;
> Count wisdom as no member of the war;
> Forestall prescience and esteem no act
> But that of hand: the still and mental parts—
> That do contrive how many hands shall strike,
> When fitness calls them on; and know by measure
> Of their observant toil the enemies' weight,—
> Why, this hath not a finger's dignity:
> They call this "bed-work," "mappery," "closet-war":
> So that the ram, that batters down the wall,
> For the great swing and rudeness of his poise,
> They place before his hand that made the engine;
> Or those, that with fineness of their souls,
> By reason guide his execution.
>
> —*Land and Water*, 6/6.

SUBMARINES AND AMERICA.—Although the war has now been in progress for nearly four years, and submarines have played a prominent part from the beginning, comparatively little is known about the enemy's underwater craft. It is true that the naval text-books contain a mass of information on this subject, but most of it is admittedly of a conjectural nature, and it is impossible to say where positive knowledge ends and pure guesswork begins. Several eminent authorities have presented us with tables in which the German submarine flotilla is analyzed and classified with marvellous detail. As a rule, these tables show, not only the total number of submarine vessels now in service, but each distinctive type, with its dimensions and other characteristics. We have recently come across one such table compiled mainly from data furnished by M. Maxime Laubeuf, the distinguished French designer. In it the German submarines are roughly divided into three groups—ocean-going, special service, and coastal, but each group is subdivided, and the three together comprise no fewer than 16 different types, the approximate dimensions, speed, endurance, armament, etc., being given in each case. The whole forms a comprehensive survey of the enemy's submarine resources as they are supposed to have existed a few months ago, and it is easy to see that an immense amount of patient research has been devoted to the preparation of this analysis. But when this much has been said, the question still confronts us: How much do we really know about Germany's submarines? Even before the war that country was singularly successful in keeping its naval secrets, and it is a remarkable but incontestable fact that every German warship launched since 1907 is still more or less a "mystery ship." In certain cases deliberately misleading data were circulated by the German naval authorities, particularly in reference to the armament and armor protection of their all-big-gun ships. As for their submarines, the only boat of which authenticated details were ever made public was the *U-1*. A few weeks before the outbreak of war it was officially stated in Berlin that 28 submarines had been completed, while "others are under construction." The total may have been incorrect, but the fact remains that with this meagre scrap of information our official knowledge of the German submarine flotilla begins and ends.

We are not suggesting that our own naval authorities are equally in the dark. On the contrary, were they so minded, they could certainly tell us many interesting things about the subsequent expansion of Germany's underwater fleet, approximately how many boats have been built, the division of types, and the distinctive features of each. But such knowledge is denied to the lay student. Naval officers whose work in the anti-submarine service has given them unequalled opportunities of observation, readily admit the difficulty of identifying hostile submarines sighted at sea. The

smaller types, especially the *UC* and *UB* mine layers, can, as a rule, be spotted at once, owing to their characteristic outline; but it is notoriously difficult to "place" the large ocean-going submersibles which are encountered far out at sea. When the "commercial U-boat" *Deutschland* arrived in American waters nearly two years ago, naval officers who saw her come in and afterwards inspected her at fairly close quarters, formed the most divergent estimates of her displacement, speed, etc. Some calculated the displacement at 1000 tons, others put it as high as 3000 tons, and she was credited with various speeds ranging from 10 to 18 knots. The same thing happened when the *U-53* appeared at Newport, R. I., in October, 1916. Every officer had his own opinion of her size and offensive qualities, but, unfortunately, it was found on comparison that no two opinions agreed. Even when in surface trim and seen near at hand, a submarine is not easy to classify. In the majority of types a considerable part of the length is hidden, as also is the beam. A fairly safe guess may be hazarded as to the caliber of whatever guns she may mount, though even here a complication is involved by the special short models supplied for submarine service, and at a distance a 35-caliber 4.1-inch might well be mistaken for a 14-pounder, and *vice versâ*. We may add that the most explicit and circumstantial descriptions of "submersible cruisers," *i. e.*, vessels of 2000-3000 tons or more, having been sighted in mid-ocean, were forthcoming at a time when, as the authorities had good reason to believe, none of these vessels had been completed in Germany. The advent of hostile submarines in American waters has been expected ever since the United States became a belligerent, and we may be sure that they would have been sent many months ago had Germany been in a position to spare them. The long period of immunity enjoyed by American coastal shipping suggests that the enemy had all he could do to maintain his home flotillas at full strength. The raiders that made their appearance off the Virginia Capes recently are believed to have been two in number; at any rate, there is no evidence yet to hand of the presence of more. So far nothing definite is known publicly with regard to the type of these two boats. Very possibly one of them represents the submersible cruiser class, but the round voyage itself is well within the compass of smaller boats, as was proved by the exploit of *U-53* some twenty months since, but this boat remained off the coast only for a single day, her fuel supply apparently being too limited for a longer sojourn. In the present instance the two German vessels may be respectively a fighting submarine and a tender, the latter carrying a reserve of fuel, ammunition, and other essential supplies for the use of the former. It was reported some time ago that the *Deutschland* and several other vessels originally built as commercial submarines had been converted into ocean-going auxiliaries. Designed as they were for a large cargo capacity, they could carry enough fuel, torpedoes, etc., to keep a fighting consort well supplied for a considerable period, and it is not improbable that the relationship between the two submarines reported off the American coast is such as we have indicated above.

This may be an experimental raid, which, if successful, will be followed by attacks on a larger scale, the enemy arguing that as the anti-submarine defence in American waters is not so well developed as that in European waters, it will pay him to withdraw some of his boats from Europe in order to use them across the Atlantic. Be this as it may, the fact that such a diversion has been attempted clearly proves the failure of the main German submarine campaign. With all their experience on this side of the Atlantic the Germans must know that two submarines, however powerful they may be, are quite incapable of interfering to any serious extent with the great volume of shipping that now enters and clears American ports. To conduct even a partial blockade of the Atlantic coast of the United States would necessitate the employment of at least 50 submarines. But Germany cannot spare anything like that number, and we must therefore conclude that in dispatching two submarines to the American coast her object was not

to make a serious attack on United States shipping, but rather to create alarm in that country and delay the departure of those troops and supplies which are so urgently needed by the Allies in France. In all likelihood this raid will have a precisely opposite effect, for the Americans are not easily intimidated, and the spectacle of war brought to their own shores will, undoubtedly, spur them on to even greater exertions.—*The Engineer*, 14/6.

THE SUBMARINE CRUISER.—In making a departure from its usual practice of reticence in regard to the sinking of German submarines, the Admiralty could not have selected any better occasion than the destruction of a U-boat of the so-called cruiser type. The vessel which was put down by one of our own submarines in the latitude of Cape St. Vincent, on May 11, is believed to be the first of Germany's new cruising submersibles to be accounted for. The loss of the boat is admitted in Germany, and there can be no doubt that it will be regarded as a serious blow by the German naval authorities. In the first place such a vessel takes a longer time to build than the smaller types of the underwater boats, and requires more labor and materials in the making. This class therefore cannot be turned out in the numbers which is known to have been the case with those of smaller dimensions. There are fewer of them and the loss is therefore the heavier. Secondly, these vessels must carry larger crews, and when as in this case all those on board are sent to the bottom, it must deprive the German Navy of a considerable body of trained and experienced officers and men. The submarine losses in *personnel* are known to have had a disturbing effect in Germany, and the non-return of the crew of one of these larger vessels will help to accentuate that feeling. Again, it has been manifest from the boasts and vaporings of German writers that great hopes have been placed upon the work which these formidable vessels were expected to accomplish by interference with, and molestation of, the Atlantic traffic. Such hopes must receive a disagreeable set-back when the destruction of this vessel comes to be widely known in Germany. It is clear, moreover, it was thought these larger vessels would be found more difficult to deal with than their forerunners. It must be admitted that, judging by the depredations which the *Emden* and her sisters were able to achieve, these anticipations of a longer and more deadly life for the cruising submersible were not without some foundation. This anticipation has also been cut short by the sinking of the underwater vessel on May 11. The occurrence does not lose in significance by the fact that the Admiralty have connected it with Cape St. Vincent, a locality already made famous by British naval exploits.

Conjecture has been rife in connection with the characteristics of these submarines of the so-called cruiser type. This is the description adopted by the Admiralty, and, it may be assumed, with good reasons. It is indeed somewhat of a misnomer to describe these vessels as "submersible cruisers," and cruising submersibles would probably be nearer the mark. Their development is the natural outcome of experience, and has followed the same lines which evolved the destroyer from the torpedo-boat and the fast cruiser from the destroyer. With each step upwards from numbers to greater size and power something is gained and something lost, and when the balance is struck it is by no means certain whether there is an assured advance. With a larger displacement the radius of action of the boat is increased, but she presents a larger target both above and below water to the gun or torpedo. Greater deck space permits of a larger gun mounting and a weapon of larger caliber. These boats are said to carry what is equivalent in German ordnance to a British 6-inch gun. There is, indeed, no technical or mechanical obstacle to mounting a still heavier piece, but there are limitations to the use of a heavy gun in a submarine. Again, a greater height between decks, and more beam, enable the provision of better accommodation for the crew, and for a larger crew. But if the ship is sunk the loss is greater, and it may well be that some sixty or seventy skilled underwater fighters went down in this cruising submersible. With

the installation of steam engines, with which the French experimented before the war, the reduction in weight makes possible the use of higher-powered machinery, greater propulsive efficiency, and more speed on the surface. But it does not necessarily follow that the maneuvering qualities of the vessel are advanced; she has a larger turning circle, and probably submerges at a slower rate. Drawing more water, she cannot operate in moderate depths, although as against this it must be said that she can withstand greater pressures and therefore make deeper descents, either to avoid obstructions or for safety. The demand for higher speeds and augmented fighting power obviously followed upon the supply to merchant ships of guns and the advent of fast anti-submarine craft. The underwater cruiser is capable of making long-distance passages and has considerable enduring mobility. She can therefore remain a longer period from her base.

Among the advantages which the Germans hope to attain by the development of the cruising submarine is undoubtedly a modification in the method of fighting the underwater vessel's foes. It indicates probably a change in tactics. Hitherto the submarine has rather avoided surface fighting. Its guns were for use against its victims, its defence lay in its power of submersion. But now the gun armament of the German submarines may in some cases be superior to that of the vessels by which they are chased, it is quite likely that they may assume the offensive and try their chance on the surface before using their diving powers. Hitherto the destroyer has been regarded as the most useful agent in anti-submarine warfare. There is not much difference, however, between the sea-keeping qualities of the destroyer and the submarine, and in ocean fighting at long ranges the former will present the larger target to the gun. This aspect of the subject leads to another view of the problem as influenced by the arrival of the cruising submarine. Long before the war it was predicted that the antidote to the submarine would be another type of submarine, and this theory found support in high naval quarters. Then with the opening of hostilities and the experience of action, the idea went out of favor and other methods were suggested and employed. Manifestly some of these methods cannot be so effective in the case of the submarine which operates many thousand miles from its base as in that of the smaller types. But Germany has no monopoly in submarine development, as is made plain by the Admiralty report on Sunday. The announcement is made that the German submarine was sunk by one of our "Atlantic escort submarines" in the latitude of Cape St. Vincent. Note first that the escort submarine was on her way to meet a convoy in the Atlantic, and, secondly, that the action took place in the latitude of Cape St. Vincent, a phrase which might mean anywhere on that parallel between Europe and America. The British submarine, then, was also a long-distance boat, and it is fair to assume that running with merely her periscope showing she caught the German vessel travelling awash and promptly torpedoed her. The Admiralty would not have revealed the details referred to had it been against the national interests. The German cruising submarine must expect in future wherever she goes to meet British vessels of her kind, and it may be that in this way the real effective remedy for the menace will be found.—*Army and Navy Gazette*, 1/6.

SIR ROSSLYN WEMYSS ON SEA STRATEGY.—In view of the appearance of German submarines off the American coast a representative of the Associated Press in London called on Sir Rosslyn Wemyss, First Sea Lord, who said:

"If I were inclined to bet I should say there has not been more than one submarine off the American coast. I may be wrong, but this is the impression I have formed. That conclusion fits in with my interpretation of the enemy's object. The Germans merely made a demonstration with the hope of causing us to decentralize our efforts to put down the submarine. We must fight the U-boat in the narrow seas. In other words, we must centralize, concentrating all our forces in what is really the decisive area. The Germans, in sending one of their so-called submarine cruisers to the

American coast, thought to raise an outcry in the United States against the policy which is now being pursued of fighting the submarines in the narrow seas. Well, I judge both from official information and telegrams in newspapers that they have already failed in their purpose."

The conversation then passed to the manner in which the American naval forces have co-operated with the Allies in the European war. Sir Rosslyn continued:

"You know, of course, that for more than a year past American men-of-war have been operating from Queenstown. It has also been known for some time that there are American ships in the Mediterranean. I do not think it can be regarded as a secret from the Germans that American men-of-war are also acting against the enemy off Gibraltar. This co-operation constitutes a remarkable testimony to the strategic insight of the American naval authorities, who also have not hesitated to send battleships to the join the Grand Fleet in the North Sea."

Discussing the relation of the two navies Admiral Wemyss said:

"On the broad lines of strategic policy complete unanimity exists. Admiral Benson and Admiral Mayo have both visited us and studied our naval plans. No officers could have exhibited a keener appreciation of the naval situation. Our relations could not be more cordial. The day-to-day procedure is of the simplest. Every morning I hold a conference with the principal officers of the naval staff, and Admiral Sims is present as the representative of the United States Fleet, joining freely in the discussion of the various subjects which arise. At sea the same spirit of cordial co-operation exists—extremely cordial I should like to say. We have fortunately a common language and common traditions, which have done much to assist us in working together. The American officers and men are first rate. It is impossible to pay too high a tribute to the manner in which they have settled down to this job of submarine hunting, and to the intelligence, resource, and courage which they have exhibited.

"This submarine business will not have any effect on a transport movement which, judged from the standpoint of a seaman, has no parallel in modern history. A year ago the enemy was boasting that his submarines would prevent the American troops from being moved to Europe, but neither the threats nor the performances of the U-boats have affected the movement. That is a very remarkable fact which, judging by the German newspapers, is producing a great impression in Germany. Not so long ago the falling off in sinkings of tonnage was explained by the enemy as being due to the fact that there were few ships to attack. And now in face of that statement the American troops are coming across the Atlantic by tens of thousands and are moving up to the firing line.

"At the same time war supplies in great variety are being brought across the Atlantic with comparatively small losses, and the food position in the British Isles is actually more satisfactory to-day than it was a year ago. In spite of the submarines we have got rid of the *queues;* the people are contented, and the general situation so far as it is influenced by the naval effort has improved, although the enemy has been making his maximum attack on every ship afloat, British, Allied, and neutral. These results have been achieved by adherence to the only sound strategic principle—concentration of effort.—*Reuter.—London Times,* 18/6.

RUSSIAN REINFORCEMENTS.—Just as the enemy seems bound to get the Russian Baltic Fleet, so it seems almost certain that he is either already in possession of the Black Sea Fleet, or must shortly be so. The Russian Black Sea Fleet, so far as we know, consists of ships similar in type to the *Gangoot,* though not quite so fast. They are three in number, and so have a broadside fire of thirty-six 12-inch guns. If the *Goeben* is fit for service, and these ships are officered and manned by Germans, they would constitute an exceedingly formidable squadron. If the four fast cruisers, laid down just before or at the very beginning of the war at the Nikolaieff

works, have been completed, the value of the battleship force would be very greatly enhanced. The Black Sea Fleet included also nine modern destroyers. Put the whole together, and there is clearly a unit of sea-power which could create a very awkward situation in the Mediterranean—if once it got to sea. For, according to the latest edition of that invaluable work, Jane's *Fighting Ships*, the Austrians laid the keels of two new battleships immediately after the declaration of war, and two more a year later. There has been ample time to finish all four. Before the war, Austria had four dreadnoughts finished, and if these could join forces with the former Black Sea Fleet and the *Goeben*, a single fleet more powerful than any Allied fleet in the Mediterranean would be constituted.

The question, of course, is: Can the Black Sea Fleet clear the Dardanelles? We know that the *Goeben* did so a few months ago, though she lost her consort in a mine field on her return, and was thought to have struck a mine herself, but the fact remains that she was not destroyed, and that, unless means of closing the Dardanelles have since been found, the sortie may be repeated.

The situation to-day, then, seems to possess for the Germans many of the characteristics of that of two years ago. They have suffered a reverse at sea far more serious than the surrender to Washington, because it puts a final stop to every hope of victory by submarine. If in 1916 they were impelled to seek a fleet action to restore their credit, the elements of compulsion in the same direction are, therefore, ten times stronger than they were. If they possess the eight powerful fast vessels that Russia built or was building in the Baltic and have added, to the limit of their own building capacity, to their fleet since Jutland was fought, they are probably relatively stronger than they were, in spite of the Grand Fleet having been strengthened by the new vessels we have constructed and by the American division which has joined us. The Germans certainly possess a vastly greater number of submarines than two years ago, and must have learned something of how to use them in battle. In the Black Sea, if they have the Russian ships—dreadnoughts and fast cruisers—they have a force which, if it could join hands with the Austrian fleet, would create an entirely new situation in the Mediterranean, one which might call for the diversion of English or American battleships to that sea to secure an adequate supremacy. It is, take it for all in all, a situation full of potentialities, and it may well happen that, before many weeks have passed, the center of interest will pass once more from the war on land to the war at sea.—*Land and Water*, 30/5.

LESSONS OF THE WAR

SPEEDY AND AGILE SHIPS BEAT U-BOATS EFFECTIVELY.—*Naval Consulting Board Reports on Devices Offered to Combat Submarine Warfare, Declaring Few Efficacious and Practicable—Bases Strongly Protected to Prevent Raids.*—The various methods employed for the protection of voyaging ships from submarines are interestingly discussed in a bulletin just issued by the Naval Consulting Board, of which Thomas A. Edison, Hudson Maxim, Howard E. Coffin and other men of constructive and inventive genius are members.

The conclusion reached by the board is that the immunity of a vessel to submarine attack is very largely dependent upon its speed and also its maneuvering ability. The percentage of vessels having speeds of 15 knots or more, and which have suffered from submarine attacks, is very small, while the loss of slow vessels, having speeds less than that of a submerged submarine, is practically 100 per cent of those attacked.

Craft of high speeds quickly pass beyond the range at which a high percentage of torpedo hits can be scored, but slower boats give the submarine ample opportunity to take careful aim and to score a hit with almost every shot.

A ship steaming at 20 knots will cover a distance of half a mile in one minute and a half, while it will require three minutes for a ship at 10

knots to cover the same distance. This shows the greater chance to escape which the high speed ships have when the submarine has finally maneuvered into a position for the proper aiming of a torpedo.

Quick maneuvering of a ship has frequently been effective in dodging a torpedo.

None of the suggestions involving the use of screens for protection against submarines has received the approval of the Navy Department or of the merchant marine. No effective means has been found to destroy a torpedo in flight or to divert one from its course.

Improved smokeless combustion is important in protecting vessels from submarine attacks, as the point of lookout on a submarine is close to the water and the position of a vessel at a distance can be determined by observing its smoke which floats high in the air.

Under favorable positions of wind and position smoke screens are valuable in saving vessels from torpedo attack.

Vessels may obtain relative invisibility also by methods of painting. Ships are sometimes "camouflaged" to resemble the sea, and various devices are used to conceal their character, size and identity. Designing ships with a low freeboard and eliminating masts, smokestacks and superstructures helps to reduce their visibility.

The destructive effect of exploding mines or torpedoes may be greatly diminished by special hull construction. The multiplictiy of watertight compartments in any hull design tends to add to the vessel's safety.

Air cells and watertight compartments decrease the convenience and carrying capacity of the different types of vessels. The problem, therefore, is to find out how much capacity the designer is justified in sacrificing to increase the safety from torpedo attack. Cargo-carrying submarines are expensive to build and operate, and are inefficient.

The answer of the Naval Consulting Board to the question, "Why are not submarines destroyed before they reach the open sea?" is as follows: "The submarine bases are very strongly protected by land batteries, aeroplane observers and large areas of thickly mined waters, extending to such distances that the largest naval gun cannot get within range of the bases. Nets when laid are promptly removed by the enemy. In spite of these facts, there is now going on a continuous attempt on the part of the allied navies to entrap or otherwise defeat the submarines as they emerge from the protected areas.

Aircraft of all sorts are used for detecting the presence of submarines. Operated either from shore or from larger ships they are sometimes very effective. Under favorable conditions a submarine is discernible from aircraft flying at a proper height, even though the submarine is submerged to a considerable depth.

While many devices which depend upon optical means of detection, such as special forms of mounted telescopes and field glasses, have been suggested, experienced and alert lookouts have proved the most serviceable. Without such men no optical device appears to be of value, and at night or in bad weather such devices are apt to be unreliable.

Contrary to the general impression that submarines are not effective against submarines, allied submarines have been successfully used in destroying U-boats. In operating against hostile submarines the searching submarine may remain totally submerged and take observations by thrusting up the periscope every few minutes, or it may remain on the surface and only dive when the enemy submarine is sighted.

A submarine is most vulnerable to attack from gunfire when it is on the surface recharging the storage batteries. The gases rising during this operation are stifling, and in giving vent to them several minutes are required to close the hatches and submerge. A submerged submarine can be reached with ordinary service shells only by high angle fire, because at low angles they ricochet on the surface of the water.

Because of the powerful effect of any submarine explosion on all neighboring bodies depth charges provide a simple means of destroying or crippling an undersea boat. When it has been even approximately located the setting off of a heavy charge of high explosive, well submerged within about 50 feet of the submarine will bring about this result.

The rapid development and improvement of the depth bomb and the increased carrying capacity of the modern high powered hydroairplane have made possible a new type of bombing hydroairplane, designed to carry a considerable number of bombs, each containing a heavy charge of high explosive.—*N. Y. Herald,* 24/6.

THE SAFETY ZONE FOR THE SUBMARINE.—By Percival A. Hislam.—That the existence of German and Austrian submarines is daily becoming more uncomfortable and hazardous is well recognized now by everyone except those enemy subjects who are still able to find cause for satisfaction in the much subdued boastings of Admiral von Capelle. Since the beginning of 1915 the counter-measures in operation against the U-boat have been multiplied not only in number but also in variety, and they now include—to mention but a few of them—surface chasers, destroyers and drifters, submarines, aircraft, cement-logged ships sunk in the mouths of their bases, and vast mine fields of which one alone, stretched across the northern exit from the North Sea, covers an area of no less than 22,000 square miles. The "chivvying" of the U-boat has been so greatly accelerated of late, and has proved so remarkably successful against U-boats in the awash or submerged condition, that it is rapidly becoming a problem for the Germans whether, after all, the surface is not the safest place for their undersea boats. Before examining this somewhat paradoxical proposition, let us glance briefly at the history of the U-boats tactics. After the sinking of the *Aboukir, Hogue* and *Cressy* had put Allied warships thoroughly on their guard, the submarines turned their attention to merchantmen and did most of their work on the surface. Only a decimal percentage of merchantmen in those days were armed, so that a U-boat could usually secure a victim by firing a warning round to bring her to, a boat's crew being then sent aboard to place two or three bombs and open the sea-cocks.

The arming of merchantmen forced the Germans to change these tactics. A submarine is very susceptible to damage, and it is the constant aim of U-boat commanders to avoid the risk of it. This spirit has naturally reached its highest development in the German submarine service, whose traditions, such as they are, have been built up almost entirely upon the sinking of defenceless merchantmen and the murder of non-combatants. The consequence was that as the arming of merchantmen was developed the submarine showed less and less inclination for surface work, and depended to a much smaller extent upon the gun and more upon the torpedo. Broadly speaking, this was in the merchantman's favor, because the torpedo is costly and often erratic, and may be avoided if its track be sighted in time, while the U-boat's capacity for destruction per voyage was greatly reduced owing to the small number of missiles that could be carried. This has been met to some extent by increasing the size of the boats, some of which now store as many as 20 torpedoes.

On the other hand, driving the U-boat under water added considerably to the difficulties of the hunt. Great increases in the surface patrols became necessary to take advantage of the fewer appearances of the U-boat on the surface. The hydrophone, an instrument for the detection of submerged sounds (both as to their direction and approximate distance) was rapidly improved to meet the situation. Aircraft were requisitioned in large numbers for scouting and bombing work, and kite balloons are frequently attached to convoys to give early warning of the neighborhood of a U-boat, whether on the surface or submerged. The systematic development of the mine field has further added enormously to the hazard of the submarine's work.

The speed and maneuvering power of specialized "chasers" are now so great, and the destructive force of the depth bomb so wide-spreading, that it virtually amounts to suicide for a U-boat to dive within sight of one of these craft. Let us take the actual position when the two spot each other. The submarine—this is a point most often overlooked—is probably not inferior in armament to anything except really up-to-date destroyers. The usual armament for submarines is either one 4.1-inch 35½-pounder and one 3.4-inch 22-pounder, or a pair of either of these weapons; but a year or so ago Germany began putting into service vessels armed with two 5.9-inch 101½-pounders and two 3.4-inch, as compared with which we have to consider the three 4-inch 31-pounders of British and four 4-inch 33-pounders of United States destroyers building early in the war. Admiral Benson, chief of operations, declared last September that Germany was believed to have boats of 5000 tons in service, and M. Leygues, French Minister of Marine, stated in May that the Germans were "about to launch a new series of submarine cruisers of great size." Either of these craft would probably carry a considerable heavier armament than that already enumerated.

Gunpowder is of use only on the surface; and it looks as if the Germans had begun to find the underseas too warm for them. A "super-submarine" is better armed than an average destroyer or chaser, and infinitely better than the drifters that have been employed against the U-boats in such large numbers, and owe their success to the weapons they can bring to bear on a submerged vessel. A well-armed U-boat that meets an Allied surface warship may either fight or dive. She cannot dive and at the same time maneuver to avoid ramming. During the diving operation she is at the mercy of the other's guns without possibility of reply; and when she has submerged, her worst enemy, the depth bomb, will begin to play about her.

And what if she stays on the surface and fights it out? In gun-power she is probably superior; she presents a much smaller target, and her exposed parts are probably fairly well armored, while those of a destroyer are very unlikely to be; she probably makes as steady a gun platform as her opponent; and her speed is probably sufficient to enable her to avoid ramming if her gunfire permitted the other to attempt such tactics. The main consideration tending to drive her under water will be the knowledge that if she is badly holed she may be sunk or rendered incapable of diving; yet her adversary runs at least an equal risk of being sunk, and is not able to dive at all. Besides, if they are at anything like close quarters and the U-boat does dive, her doom is as certain as anything well can be.

Can it, then, be regarded as altogether paradoxical to argue that the safest place for enemy submarines is on the surface? I think not; and from the way the Germans are arming their latest boats they seem to think the same. Obviously, a submarine that can stand up to a destroyer in open fight, *and can resist the temptation to dive,* will need something above the grade of the average present-day destroyer to deal with her.—*Scientific American,* 6/6.

THE RÔLE OF THE KITE-BALLOON IN ANTI-SUBMARINE OPERATIONS.—By Robert W. Neeser.—The student of naval tactics will search the books on that subject in vain for references to the use of kite-balloons in major operations at sea; yet this ungainly creature that sits tailwise in mid-air, can hardly be said to be the product of the present war. The French used war balloons as early as 1794, in their operations against the Austrians, to the discomfiture of the latter, who denounced them as "an insidious form of attack" and declared that all balloonists who fell into their hands would be treated the same as spies. During the Franco-Prussian War, the French had recourse to the use of balloons after the investment of their capital, for communicating with the outside world, and these balloon sorties so

vexed the Prussian military commanders that they sought by every means possible to invent guns for use against the "blockade runners."

The old-fashioned spherical gas balloon, however, had many defects, even when anchored as a stationary observation platform. The chief drawback was its natural instability. In a dead calm it would revolve continually owing to the tendency on the part of the cable holding it to untwist itself, while in a breeze the balloon oscillated backwards and forwards so violently that it rendered any satisfactory observation work practically impossible. During the siege of Port Arthur, the Japanese for the first time made use of an elongated type of kite-balloon, manufactured out of the remains of an unsuccessful airship, but, while the new model gave good results, it was evident that much still remained to be done before the observation balloon could be depended upon as a reliable arm of the military and naval service.

Before the outbreak of the European war, the kite-balloon was not looked upon with favor by any of the military or naval powers, except Germany and Austria. The French army in 1914 had a number of spherical balloons, but these could not compete with the more stable "drachen ballon" with which the invading forces were equipped. Fortunately for the Allies, the Belgian government had a specimen "drachen" which it had purchased from Germany some time previous, and this, as soon as it became apparent how greatly superior the kite-balloon really was, was copied by the various allied services until they themselves could devise something better. It was in this way that the French, after experiments held at the front under actual war conditions, produced their famous Cacquot balloon. Thanks to the ingenuity of the French inventors, the Allies thereby obtained the service of a kite-balloon which not only embodied all the good qualities of the "drachen ballon," but in addition proved capable of being used in a high wind besides offering greater facilities for observation.

At sea, the use of kite-balloons was unknown until the year 1916, when the constantly increasing activities of the German submarines caused the Allied navies to resort to novel measures for combating this new pest of the seas. The British naval airmen were the first to venture experiments in this new field, and the trials were so satisfactory, notably in the case of the "sausage" which spotted for the "Queen Elizabeth" when the latter was firing across the Gallipoli Peninsula in order to reach the Turkish forts on the Asiatic shore of the straits, that the French also decided to adopt the "ballon captif" as a recognized type of naval aircraft.

It is evident that the advantages offered by these aerial observation posts in extending the range of vision of the naval lookouts charged with the duty of reporting the presence of the enemy's submarines, could not be overlooked. Anchored over some shore station, the observers surveyed a considerable area of the waters adjacent to the roadstead, inlet, channel, or sound, which they were assigned to watch. On the water, the rôle of the kite-balloon was the same, only instead of being anchored on terra firma, the end of the cable would be made fast to the deck of some trawler or fast steaming patrol vessel cruising on the surface of the sea. In this way the range of vision of the mast-head lookout on the warship could be trebled or at a height of two or three hundred yards, the "horizon" of the aerial observer extended for a distance of about thirty miles.

It is from this lofty perch that the presence of floating mines, of obstructions, of vessels in distress, and of hostile submarines, are thus discovered. A U-boat cruising on the surface becomes plainly visible to the aerial observer at a distance of several miles, while the foamy streak of the periscope's wake cannot remain unnoticed for any length of time. The kite-balloon, by its mere presence therefore, causes the enemy's commerce raiders to seek the protection of the ocean's depths. In this way the submarine's offensive powers are curtailed almost immediately from the moment that it comes within the "zone" of the kite-balloon. This prevents the German commander from coming to the surface to use his deck guns, and this factor alone is an extremely important one. If, on the other hand, the

enemy persists in coming nearer in order to use his torpedoes, he can carry out his "approach" only beneath the surface, and here again the aerial observer has the advantage. While running submerged, the submarine must come to the surface occasionally in order to take a sight with its periscope. This maneuver, however, instantly betrays the submarine's movements to the observer and permits him to warn the patrol-boat, either by signal or telephone, of each change in course, or of the direction from which a torpedo has been fired (in case the submarine commander decides to strike by launching one of his subsurface missiles) long before the captain on the man-o'-war's bridge can himself see the threatened move. The kite-balloons have also been found useful in connection with the all-important operations of mine-sweeping and of guiding the convoys and merchant vessels through navigable waters. Naturally the usefulness of the kite-balloon depends upon the continuance of daylight and upon the very essential atmospheric conditions as regards visibility.

The British Navy solved the problem of housing its kite-balloons at sea by the creation of "balloon transports" such as were first used during the naval operations in the Dardenelles. In the coastwise operations, such as have characterized the anti-submarine war of recent years, the French have found themselves confronted with a different problem which they met with their usual ingenuity by basing their naval balloons on the various shore stations that dot their coast. At each of these "centers" fully equipped aerodromes were organized, with hangars containing the inflated balloons ready for instant service, and depots fitted with the necessary machinery and personnel for inflating and repairing the fragile silken envelopes. It takes only a few minutes, after a strange sail is reported on the horizon, to bring the kite-balloon out of its hangar, attach the end of its cable to the stern of a towing vessel, place on board of the latter the aeronautical detachment assigned to duty with that balloon, and dispatch the observer on his aerial reconnoissance. Officers commanding the patrol vessels charged with the duty of towing the kite-balloons have reported that this operation in no way affects the navigation of their ships, nor handicaps them in the least, and this enables the balloons to be used at sea for long periods or until the patrol vessel returns to one of the many shore stations equipped with aerodromes, when the kite-balloon is "landed" as easily as it was "launched" in the first place.

Up to the present time, there has been no occasion to use kite-balloons in connection with fleet operations, but who can tell whether in the next great naval battle of the war, their co-operation may not become essential, not only for reconnoissance purposes but also for the satisfactory control of the fire of the main-battery guns? On land, the co-operation of the "sausages" has been found necessary to the success of every major operation against the enemy's lines. It seems only logical that at sea their rôle should be the same, namely to act as an aerial eye for the admiral, whom modern naval science has doomed to direct his fleet from within the steel walls of an armored conning tower, as well as for the naval gunner, whom the tremendous power and range of modern weapons has destined to fight an enemy below the horizon.—*Scientific American*, 13/7.

GERMANY'S LOST ILLUSIONS.—By Arthur Pollen.—An astute French statesman remarked, when war broke out, that the folly of Germany could be measured by the fact that, by combining Russia and Great Britain against her, she had set out to attack the "two great intangibles." Russia seemed to be protected by the vastness of her territory and the simplicity of her political organization; Great Britain by her ocean girdle. The epithet has long since been proved untrue of our northern ally. But it is still true of Great Britain; and for the reason that it is true of us, it is true also of the ally that joined us when Russia was on the eve of collapsing—America. Now, when the military force of Germany, relieved of pressure on the Eastern front, can concentrate its entire weight against us in the West, it

is wholesome to bear in mind the truth that still remains in Monsieur Cambon's aphorism. It recalls to our recollection the fact that primarily and ultimately, the war, like its great predecessor a century ago, is for us a sea war; and that though our military contribution has been upon a colossal scale, the essential truth remains that, in winning or losing in a war with Great Britain, it is in what happens at sea, and not what happens on land, that the issue will be found. And that truth is incalculably more obvious when America is allied to us in the West with her resources in men only just beginning to appear in the field of war, and with Japan allied to us in the East, whose man-power has not yet been touched at all.

It is this fundamental truth that made the situation a year ago so intensely grave. For we were within measurable distance of being beaten at sea by the submarine. And it is because the submarine is becoming week by week a lesser danger, and because week by week the shipping of the Alliance is increasing much faster than it can be destroyed, that we shall do well to remember that, whatever our anxiety in watching, the titanic struggle, while it must be decisive for Germany if Germany fails, will be far from being decisive for the Alliance if Germany were to succeed.

There is all the more reason why we should bear this truth in mind, because the clearer headed Germans can see it for themselves. There has recently become accessible to us the full text of three very significant statements. The first is von Kühlmann's speech to the Berlin Chamber of Commerce, delivered on the occasion of his reporting and defining the German peace with Rumania. Next, there is Herr Dernburg's article in the *Neue Freie Presse* dealing with the American threat of the after-war boycott on raw materials. Lastly, there is Erzberger's defence against those who attacked him and his advocacy of the "No Annexation" resolutions passed a year ago in the Reichstag.

Von Kühlmann's speech is, naturally enough, a rhapsody over Germany's colossal apparent triumph in Russia, the Ukraine, and Rumania—a triumph the economic results of which are to be realized by a ruthless exploitation of the conquered peoples, carried out in perfect agreement with Austro-Hungary, Turkey, and Bulgaria. Though the prospect is dazzling, he adds that the Germans would make a very big mistake if they contented themselves with extending their economic base on the European continent, and were satisfied if they simply put themselves into a position to compete "numerically" with such units as the United States of America.

"These are not the aim and conclusion of our development, the Rhine flows into the North Sea, and the mightly Elbe, the artery of Central Germany, points us in the same direction. All these efforts . . . . will in the long run be a spur and incentive to German trade to gravitate towards the first element of all great and really free trade, the free seas. To prepare this trade, to serve and strengthen its cause is the ultimate and highest aim of all the work and all the efforts, which have been brought before your mental vision to-day. When victory and peace shall have been won in this greatest of all wars, thanks to the valor and tenacity of the German people, and the genius of their leaders, and German merchant ships, built of German steel shall again sail the free seas under the black, white, and red stripes, then, ... the German merchant will prove to the world that, in these years of sacrifice, he has only become more capable, more ready for peaceful competition with every nation, and not unworthy of the proud motto: *Nulli Secundus.*"

So that, unless his country can, when war is over, get back to pre-war conditions at sea, then all Germany's war efforts must have been wasted.

Herr Dernburg is far more specific. Except for Germany's apparent monopoly of potash, he has to admit that neither Germany nor any of the neutrals subservient to her, produces any of the raw materials of which the rest of the world has need. Whereas the British Empire, the United States, and the South American republics that have declared war against Germany,

practically monopolizes the raw materials, without which German industry is helpless. Peace, therefore, when it comes, he says, must include the fair rationing of these raw materials between all the nations. He notes that the Nonferrous Metal Act, and wholesale purchasing of wool clips and crops have already made state monopolies of many of these essentials to German industry. The treaty of peace, then, must not merely guarantee a freedom for the Germans to trade on an equality with others in all these countries, it must provide compulsory powers of allocation to Germany of her share of these highly desirable products! And it dawns on the puzzled Dernburg that this means a "League of Nations for the universal world provision of a humanity suffering from an impoverishment of raw materials." Perhaps we shall not all agree upon the definition of "humanity." The Allies will be able to look after themselves and their friends, and the German claims to be included in "humanity" will certainly require strict proofs. Dernburg evades this point, and proceeds:

"A thing of this kind (i. e., this economic League of Nations) cannot be obtained in the event of a peace won purely by force. It requires peace by understanding for which we are now, as always, ready, but which can only be concluded when our opponents have arrived at a similar position of reason. Our goodwill has not advanced us much in this direction. To-day the task which we must pursue with all our might is to bring about this condition of reason by force of circumstances."

The German mind is surely a strange thing. Dernburg realizes as clearly as any man can that peace obtained by force—such, for instance, as a German victory in France—will not bring them what Germany wants, *i. e.*, a League of Nations, based on equality of economic supply. He also realizes that this can only come by a peace by "understanding." "Let us, then," he says, "go forward with all our might—*i. e.*, by force of circumstances—to bring about not a peace won by victory, but a condition when they, like us (the Germans) will attain to that sweet reasonableness which makes some other kind of peace possible."

Erzberger has to deal with his critics with one hand tied behind his back. He cannot say, for instance, that Turkey, Bulgaria, and Austria, are beaten already, nor can he reiterate what he hints, viz., that the warning he uttered in October, 1916, as to the result of unrestricted U-boat warfare, has proved him to be right and his critics wrong. It has made an irreconcilable opponent of America without disposing of the other irreconcilable, England. Germany is left, then, still needing a peace by understanding, but is further off than ever from any possibility of getting it. The people are being fooled by being told that the military successes are decisive victories, and their war passion excited by the prospects of annexations and indemnities. But the truth, he says, is that the bulk of Germany wants only German rights, and that annexations, in the interest of scientific frontiers, have no meaning in these days of long-range guns and aeroplanes; and that all this talk only postpones the only finish of the war that can help his country.

Now it seems to me quite a remarkable thing that three men, so different in origin, experience, and environment, should show agreement on an issue so fundamental as this. They all see as clearly as possible that the thing Germany must have—or perish—is exactly the thing which cannot be obtained by force of arms on land. If Germany is to turn her conquests in the East into permanent realities profitable to herself, she must first come to a working agreement with all the rest of the world. Without wool, cotton, rubber, hides, vegetable oils, and a host of other products, she cannot regain that industrial vitality without which the exploitation of the Russian and Rumanian conquests will be impossible. Without a free sea, no internal industry can bring national wealth. Now, these two indispensable things—raw materials and free sea commerce—do not follow automatically from the only kind of victory dangled before the German vision.

If Germany could conquer the armies of Italy, France, England, and America on land, and beat all our fleets, too, then the countries of the outer

world would have to come to the same kind of "peace by understanding" with Germany to which Russia, the Ukraine, and Rumania—not to mention Poland and Finland—have already been driven. But there is no prospect of sea victory on this or any other scale. Max Cohen, indeed, will have it still that the U-boat will win; but he speaks to a formula in which no one trusts. It is significant that Erzberger while speaking respectively of the efficiency and the gallantry of the submarine personnel, is under no illusions as to any chances of submarine victory. Dernburg is silent on the subject altogether, and Kühlmann, while talking glibly of the freedom of the seas, suggests no means by which the rest of the world is to be free of the peaceful use of the seas, if Germany is to remain free to renew her piratical sabotage whenever she thinks fit.

The growth of German opinion on these subjects will be well worth watching. It is something, at any rate, to have a Secretary of State admitting that it is peace on sea and not peace on land that Germany needs, and one of the foremost of her political thinkers asseverating that peace on sea is not a thing that can be the fruit of land victory.—*Land and Water*, 20/6.

ATLANTIC

NEW YORK TROOPS DESCRIBE U-BOAT ATTACKS ON SHIP.—*Soldiers' Letters Tell How American Destroyers Ended Submarine with Bombs.*—German submarines provided plenty of thrills and excitement for the men of the Twenty-seventh division, formerly the New York National Guard, after the transports that carried them to France entered the war zone, according to letters from New York boys reaching this city yesterday. Three times in the course of a few days the U-boats bobbed up in the path of the troop ships, only to be driven off by the watchful destroyers before they could do any damage. One of the submarines was put out of business.

The persistence with which the U-boats hovered about the transports indicated, in the opinion of the men on board, that the commanders of the undersea craft had been ordered to make special efforts to sink the troop-ships. The New York soldiers got their first thrill a few minutes after the convoyed transports entered the war zone, early Sunday evening, a periscope appearing suddenly in the midst of the transports about three hundred feet from a vessel carrying a cargo of T. N. T.

The soldiers say the periscope had barely showed itself before the naval gunners began deluging the spot with shells, forcing the U-boat to submerge. The instant the periscope was sighted, according to the letters, the "abandon ship" signal was sounded, and in a few minutes the soldiers were in life preservers, ready to plunge into the sea if it became necessary. Two evenings later, about the same hour, another periscope was sighted less than 100 feet from the ship laden with the high explosives. The destroyers immediately opened fire, one of them circling around and dropping depth bombs over the spot where the periscope had vanished.

Two dozen depth bombs were sent below and presently the black, oily bubbles that came to the top told the story of the destruction of another Hun submarine and its crew. The transports were in sight of land late in the afternoon a few days later when two more U-boats were seen in the wake of the convoy. One of the submarines fired a torpedo, which went wide of its mark, and then the destroyers and submarines engaged in a lively encounter, the result of which was not known to the writers. The letters told of the fleet of French airplanes that came out to strengthen the guard about the transports.

NAVY HEADS DOUBT SINKING OF U-BOATS.—Although there have been various reports recently of the destruction by patrol vessels and armed steamships of one or more of the German submarines operating off the Atlantic coast, it was learned authoritatively to-day that the Navy Depart-

ment is without evidence that would justify the belief that any of the sea wolves have been accounted for.

In discussing the many reports which have been circulated about the destruction of the U-boats since they first appeared on American waters, nearly a month ago, Assistant Secretary Roosevelt said this situation is merely a repetition on a small scale of the experience of the British Admiralty.

Mr. Roosevelt had before him the quarterly report of the Admiralty on submarine losses, the items included being only those who were considered of sufficient credibility to warrant consideration. Taking 100 typical reports, Mr. Roosevelt explained that 50 per cent of them had been dismissed by the British authorities as "highly improbable." After careful rechecking, 20 per cent of the submarines reported sunk were listed as "possibly damaged." Only 13 per cent of the total were recorded as "known to have been sunk."—*N. Y. Herald*, 21/6.

SUBMARINE CHASER ON MAIDEN TRIP SINKS ENEMY SUBMERSIBLE.—*Officers of Vessel Tell of Exploit Off Coast of France—Steamship Brings 201 Passengers.*—An account of the sinking of an enemy submersible by an American submarine chaser a few miles off the coast of France on May 20 was brought to the United States last night, following the arrival of a French steamship at an American port.

The submarine chaser was on her maiden voyage to France and was in charge of Ensign Maurice Verbreach, of No. 2045 Gates Avenue, Brooklyn, and Ensign Anthony van den Heuvel, of No. 61 East End Avenue, Manhattan. They were passengers aboard the French steamship, which reached this country last night with 30 officers of American submarine chasers among her passengers. These officers are returning home after having delivered their vessels safely on the other side of the Atlantic.

Ensign Verbreach said that early on the morning of May 20 while en route with their submarine chaser to a French port they sighted an American patrol vessel, aboard which were the survivors of an American steamship which had been sunk by an enemy underseas boat. Half an hour later, he said, they encountered the German submarine which had sunk this ship. The enemy was about a mile off, but the submarine chaser at once opened fire on her. No time was given to the Germans to fire a torpedo. Thirty shots were fired at the submarine before she disappeared.

Half an hour later an American destroyer came in sight and signalled that the submarine chaser had destroyed the enemy boat. "For good measure, we have dropped two depth bombs where the submarine went down," the destroyer signaled.—*N. Y. Herald*, 24/6.

AMERICAN STEAMER PURSUED BY U-BOAT.—An American steamer arriving here June 20 from a Central American port reported that at 4 p. m., June 19, 180 to 200 miles south of Sandy Hook, she sighted a submarine and was pursued by the U-boat.

The captain said that he put on full speed, zigzagged and escaped by outdistancing the U-boat. His ship carried 57 passengers.

This is the first report of the appearance of a German raider so far north since ships were sunk off the Jersey coast in the latter part of May. —*Evening Star*, 20/6.

PURSUED OFF SOUTH CAROLINA.—A coastwise passenger steamship which arrived here late June 19 encountered a German submarine at 1.35 p. m. June 18 off the coast of South Carolina, it was learned to-day, but made good her escape because of superior speed and her wireless calls for help, which apparently forced the submarine to give up the chase.

Officers of the steamer sighted the submarine as it came to the surface less than a mile off the port bow. It started full speed for the ship, at the same time diving. The steamer immediately was put on a zigzag course

and when the submarine came to the surface again it was nearer, but for some reason did not fire. Wireless calls for help were being sent out rapidly and the U-boat quickly gave up the chase, apparently fearing the appearance of patrol vessels.

Only two passengers were aboard the steamer.—*Evening Star*, 20/6.

U. S. S. STEAMER "SCHURZ" SUNK IN COLLISION OFF CAROLINA.—The Committee on Public Information issues the following:

The Navy Department is informed that the U. S. S. *Schurz* collided with the steamer *Florida* at 4.40 a. m., June 21, and sank 10 miles southwest of Cape Lookout, off the North Carolina coast, at 6.40 o'clock. Manuel Gouveia, Jr., seaman second class, was killed, but all the other members of the crew are reported saved. They were picked up by a steamer and are on their way to an Atlantic port. Gouveia enlisted at Pearl Harbor, Hawaii, April 29, 1917, and gave as his next of kin, father, Manuel Gouveia, Honolulu.

The *Schurz* was the former German vessel *Geier*, which was taken over by this Government. She was a steamer of 1600 tons, 255 feet long.—*Official Bulletin*, 22/6.

June 25—Masters of vessels arriving at Norfolk, Va., report the presence in West Indian waters of a fast and heavily armed German raider.—*Literary Digest*, 6/7.

RETURNING TROOPSHIP SUNK.—The British transport *Dwinsk*, under charter to the United States, was sunk without warning by an enemy submarine about 700 miles off the Delaware Capes last Tuesday morning, A report of the sinking was contained in an undated special cable despatch to the *Herald* which later proved to be from the *Herald* correspondent at Bermuda.

There were no troops on board the *Dwinsk*, which was returning from abroad. She carried a crew of 148 officers and men, 67 of whom are reported missing. Eighty-one have been rescued, two boatloads of survivors having been landed at this port, one at Hampton Roads and one at Bermuda.

Seventeen of the crew of the *Dwinsk* were picked up last Wednesday by a schooner bound from Halifax to Bermuda and were landed at the latter port yesterday. The rescue was made in latitude 39 degrees 10 minutes, longitude 63 degrees. They had been in an open boat about 24 hours when rescued.

Survivors landed at Bermuda said the submarine was not sighted until after a torpedo had struck the vessel. The crew took to the boats as the transport began to settle. They declared it would have been useless for them to have attempted to use the ship's guns against the Hun raider.

After launching a torpedo the submarine appeared on the surface and fired nineteen shots into the *Dwinsk*, they said.

There was much speculation in shipping circles here last night regarding the identity of the submarine which destroyed the *Dwinsk*. It was not known whether she was one of the German submersibles which recently preyed upon American shipping off this coast and was returning to her European base, or whether she was operating exclusively in mid-Atlantic. The consensus, however, was that in view of the fact that the sinking was far outside the European zone of submarine activity, the U-boat was bound for a German base on the other side of the Atlantic after her operations in American waters were brought to an end.

How successfully the Navy Department has safeguarded the movements of transports with American troops is evidenced by the fact that German submarines have been able to sink only four of these vessels, three returning from Europe and one eastbound. To offset these sinkings upward of one million United States soldiers have been transported from American ports to France.

The list of transports in the United States services which have been sunk by enemy submarines is the *Antilles*, the *President Lincoln* and the *Dwinsk*, all of which were returning to this country from Europe when destroyed, and the *Tuscania*, which was sunk while bound from an American port to Europe.

The *Dwinsk* was originally the C. F. Tietgen, built in 1897 by Harlan & Wolf, Limited, of Belfast, for the Russian East Asiatic Steamship Company, Limited. She was later taken over by the Holland-American line, and her name changed to the *Rotterdam*. Later still she came into the possession of the British Government, and was converted into a transport with the name of *Dwinsk*. She was a twin screw steel steamship of 8173 gross tonnage. Her length was 469.5 feet, her beam 53.1, her depth 22.3. No information as to her movements since she was put into the British service is available.—*N. Y. Herald*, 25/6.

SAILORS FROM SUNKEN SHIP RESCUED AT SEA.—A boatload of 24 sailors from the steamship *Dwinsk*, sunk by a submarine off the Atlantic coast, was landed this morning by a fishing vessel at Shelburne, N. S., says a message from that port to-day. The men were picked up 60 miles south of Seal Island, in the Gulf of St. Lawrence. They had been drifting for eight days, surviving on a small quantity of bread and water.

Previous reports of the destruction of the *Dwinsk*, a British ship under American charter, said she was sunk June 18, 700 miles east of the Delaware Capes.

New York, June 28.—The landing of 24 survivors from the steamship *Dwinsk* at Shelburne, N. S., to-day definitely accounts for all but two boatloads of the crew. The *Dwinsk* was a troopship, returning to the United States. She had no soldiers aboard.—*Evening Star*, 28/6.

DESTRUCTION OF CANADIAN HOSPITAL SHIP.—Despite the fact that she was traveling without a convoy, with all lights burning, and all distinguishing marks of a hospital ship plainly visible, the Germans torpedoed the *Llandovery Castle*, a Canadian hospital ship, on the night of June 27, while she was returning to England from Halifax. The attack occurred about 70 miles from land, and the fatalities were very heavy, although, fortunately, no wounded were on board. It is surmised that the German submarine commander mistook her for the American hospital ship *Comfort*, as he probably thought she was about due; and this surmise is further borne out by the statement of the Hun captain to the survivors that he suspected there were aviators on board. It will be recalled that when the voyage of the *Comfort* was first broached, some weeks ago, and it was proposed to send her over without escort and relying solely upon the protection due her by international agreement, the *Berlin Lokal Anzeiger* issued this sinister inquiry and threat, which seems to be echoed by the captain of the submarine.—*Army and Navy Register*, 6/7.

U-BOATS SUNK.—Destruction in European waters of German submarines by British transports and by American and British destroyers convoying them was described by passengers who arrived here yesterday on an English liner. The transports, one of which was carrying 7000 American soldiers to Europe, accounted for three of the U-boats, and the destroyers sank the other two, according to the voyagers. Officers of the liner confirmed their stories.

The passengers witnessed the torpedoing of the 5436-ton British freighter *Orissa*, which was part of their convoy, when the fleet was approximately a day out, steaming west from the British Isles. The *Orissa*, bound in ballast for the United States, was sent to the bottom by an unseen submarine. A moment later, however, an American destroyer in the protecting fleet detected the undersea boat below the surface and dropped a depth bomb, making a direct hit, according to the story related here. The same evening

a U-boat was sighted by the passenger vessel, whose gunners sank it by shell fire.—*Washington Evening Star*, 5/7.

TRANSPORT "COVINGTON" TORPEDOED.—The American army transport Covington, homeward bound, after landing several thousand soldiers in France, was torpedoed and sunk in the war zone on the night of July 1, with a loss of six of her crew. All the other men, with the ship's officers, have been landed at a French port. Neither any army personnel nor any passenger was aboard. The *Covington* was struck at 9.17 p. m., on Monday, July 1, while proceeding with a fleet of other transports convoyed by destroyers. The submarine was not sighted. The transport remained afloat until Tuesday, when efforts were made by another vessel and two tugs to tow her to port, but she was too badly damaged to keep afloat.

"The torpedo struck forward of the engine room bulkhead," the Navy Department's report said, "and the engine room and fire room were rapidly flooded. With its motive power gone, the vessel was helpless, and, facing the possibility of the torpedoing of another ship in the convoy, the *Covington* was temporarily abandoned. This was done in excellent order, and the officers and the crew were taken on board a destroyer. The submarine was not seen. At daybreak, the captain, several officers, and a number of members of the crew, returned to supervise salvaging operations. Another vessel and two tugs took the Covington in tow in the effort to get her to port, but she was too badly damaged to keep afloat, and sank."

The *Covington* was formerly the Hamburg-American liner *Cincinnati*, which was laid up at Boston, and taken over when the United States entered the war. She was 608 feet long, of 16,539 gross tons, and had a speed of 15½ knots, and was built at the yards of Blohm & Voss, in Hamburg, in 1908.

The *Covington* is the second of the great German liners seized at the outbreak of the war to be sent down by Germany's submarines, and is the third American troopship to be destroyed. All were homeward bound. The Hamburg-American liner *President Lincoln* was sunk last May 31, and the *Antilles*, formerly a Morgan liner, was sent down last October 17.—*Nautical Gazette*, 13/7.

U-BOAT OFF ATLANTIC COAST.—A German submarine, appearing 300 miles off Cape Race on July 6, captured the Norwegian bark *Manx King* and ordered the crew of 19 to take to the boats, it was learned to-night when the survivors were brought here on board a British steamship, which picked them up at sea. The survivors said they did not know what became of the bark, whether she was sunk or converted into a raider by the Germans.

The *Manx King*, which is a vessel of 1729 gross tons, left a United States Atlantic port about two weeks ago. She is the first craft which has been reported as encountering a U-boat so far north in the Atlantic.

The crew explained that they became so excited at meeting a submarine that they promptly obeyed the order to abandon the bark. Pulling away rapidly, they were overtaken by darkness before seeing what disposition had been made of the sailing vessel. None of them reported having heard any explosion.

The *Manx King* was built at Stockton, England, in 1884. She was registered at Fredrikstad as owned by T. Wilhelms and Axel Jacobsen. She was commanded by Captain Helgesen.—*N. Y. Herald*, 13/7.

EFFECT OF THE GERMAN U-BOAT RAID.—If the German submarine raid begun off the Atlantic coast on May 25, was designed to intimidate American shipping it failed signally of its purpose. During the interval while the raiders were destroying 10 American vessels, totaling 26,000 tons, American shipbuilders were turning out 21 new vessels, totaling 130,642 deadweight tons, or over 100,000 tons more than the totals losses. Further than this, the spirit of determination aroused in the shipbuilding and shipping

industries will continue to react against the enemy until final victory is won.—*Marine Engineering, July.*

U-BOAT THOUGHT SUNK BY GUNS OF STEAMER 1500 MILES OFF THE CAPES.—A German submarine which attacked the American steamer *Lake Forest*, 1500 miles off Cape Henry, while she was returning from a recent voyage to Europe, is believed to have been sunk by the steamer's guns after a two-hour running fight, according to information received here to-day in marine circles.

Captain Herbert R. O. Johnson, United States Naval Reserve officer in command of the ship, has been commended to the Navy Department for having sunk the U-boat by officers associated with him in the Naval Reserve. Details of the fight, however, are yet unavailable. The *Lake Forest* was formerly the *War Fox*, and was taken over by the United States Shipping Board on the Great Lakes soon after she was launched.—*Washington Evening Star*, 11/7.

ARMY SUPPLY SHIP SUNK; TEN OF CREW OF 92 ARE MISSING.—*The Westover, 4270 Tons, Torpedoed in War Zone, Navy Announces.*—The American steamship *Westover*, an army supply ship manned by navy men, was torpedoed and sunk in the war zone July 11, while bound to Europe, the Navy Department was advised to-night by Vice Admiral Sims.

Ten officers and men of the crew of 92 are missing.

No details were given in the Navy Department's brief announcement, and the circumstances under which 82 officers and men of the crew were rescued are not known. Nor was there any announcement as to whether the submarine was sighted and fired upon by the armed guards on the steamer.

The *Westover* was 4270 net tonnage, and was last reported at an Atlantic port on May 27. She came from the Pacific coast, having left Tacoma and Seattle April 22. She was 420 feet long and 54 feet broad.

U. S. CRUISER "SAN DIEGO" SUNK.—Announcement by the Navy Department to-night that the United States armored cruiser San Diego had been sunk to-day off the Long Island Coast indicated that German submarines may again be operating in American waters. The cause of the vessel's destruction and the casualties that may have resulted were unknown at a late hour.

The vessel itself was not regarded as a serious military loss. If she was a victim of enemy submarines, however, it is obvious that the U-boats are in the transport lanes and close to the entrance of New York harbor, for the *San Diego* went down 10 miles southeast of Fire Island.

Until the statements of survivors definitely establish that the vessel was sunk by a torpedo there will be a possibility that she struck a drifting defense mine or was sent down by accidental internal explosion or otherwise.

The only formal statement issued by the department was based on first reports. It follows:

"The Navy Department has received reports from the third naval district stating that the *U. S. S. San Diego* was sunk 10 miles southeast of Fire Island light at 11.30 o'clock this morning. One officer and two boats' crews were landed at life-saving station No. 82, on Long Island. Other survivors are in boats and four steamers are standing by.

"So far as can be ascertained, there appears to have been no loss of life. The cause of sinking has not yet been determined. The *San Diego* was an armored cruiser of 13,690 tons displacement and carried a complement of 1114 officers and men. She was 502 feet long and had a speed of 22 knots. Her main armament consisted of four 8-inch guns in turrets and fourteen 6-inch guns. She was built at San Francisco in 1899.

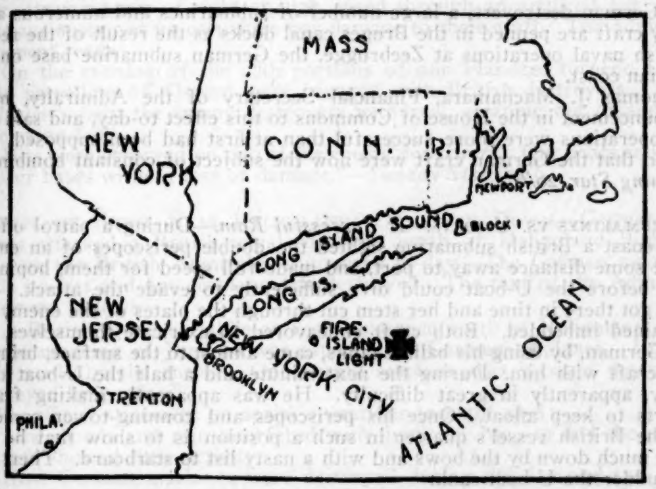
The *San Diego* is the first major warship to be sunk by Germany's U-boat and the first war craft to be sent down in American waters.

The *San Diego* served for years as flagship of the Pacific Fleet and she and similar craft have been found very valuable in connection with convoy work, although classified as of limited military value for ordinary naval operations.

The ships of this type were built a number of years ago and do not contain modern devices to protect them from submarine attacks.

The *San Diego* was bound from the Portsmouth, N. H., Navy Yard for New York when she was sunk. Captain H. H. Christy was in command, and on board were 51 officers, 1030 enlisted men and 63 marines. The vessel had been undergoing repairs at the navy yard.

Late to-night the Navy Department would add nothing to this statement and officers professed to have no information as to the cause of the loss of the number of survivors. It was apparent, however, that officials were prepared to hear that some lives were lost despite the optimistic tone of the initial dispatches.



LOCATION OF FIRE ISLAND LIGHT. THE GREEK CROSS MARKS THE POINT WHERE THE ATTACK OCCURRED.

The return of the underseas raiders was not unexpected, since the sinkings of May and June had shown that the German Admiralty was capable of carrying submarine warfare to the very doors of America. The *San Diego* was the first major warship to be lost since the country entered the war. None but commercial coastwise ships fell prey to the submersibles on their first raid, and in the war zone none but destroyers, transports and small patrol boats have been successfully attacked.

Despite reports of attacks on other ships and that warnings had been sent to coastwise shipping to keep close to the coasts, naval officials steadfastly maintained they had no information on which to believe that the submarine had come again.

The official dispatches to the Navy Department to-night were so far behind the news reports of the disaster and so lacking in details that little official opinion could be formed. The popular effect of the loss of the *San Diego* on the psychology of the national capital, however, was the cause of a great deal of comment.

It aroused a war spirit and a popular commotion far exceeding the news of the great drive by American troops in France, which as a proposition

of military importance is of vastly more concern than the loss of a comparatively unimportant ship and the loss of probably very few lives, if any. It may be stated that all the agencies which the Navy Department has at its command for hunting the submarines are in action and officials are still entirely confident of their ability to protect the coasts. If another raid has been started with the object of a popular agitation to cause the return of American naval forces in the war zone it undoubtedly will prove in that respect a failure.—*Baltimore American*, 25/7.

NORTH SEA AND CHANNEL

Air raids on Zeebrugge, Bruges and Ostend have been very numerous, inflicting considerable damage. Direct hits have been observed on German vessels in the canal and important store sheds.—*London Times.*

TWENTY-ONE GERMAN DESTROYERS PENNED UP AT ZEEBRUGGE.—Twenty-one German destroyers, a large number of submarines and numerous auxiliary craft are penned in the Bruges canal docks as the result of the recent British naval operations at Zeebrugge, the German submarine base on the Belgian coast.

Thomas J. Macnamara, Financial Secretary of the Admiralty, made announcement in the House of Commons to this effect to-day, and said that the operations were more successful than at first had been supposed. He added that the German craft were now the subject of constant bombing.—*Evening Star*, 20/6.

SUBMARINES VS. U-BOATS.—*A Successful Ram.*—During a patrol off the east coast a British submarine sighted the double periscopes of an enemy craft some distance away to port, and made full speed for them, hoping to ram before the U-boat could dive sufficiently to evade the attack. Our boat got there in time and her stem cut through the plates of the enemy and remained imbedded. Both craft endeavored to extricate themselves, and the German, by using his ballast tanks, came almost to the surface, bringing our craft with him. During the next minute and a half the U-boat drew away, apparently in great difficulty. He was apparently making frantic efforts to keep afloat. Once his periscopes and conning-tower came up on the British vessel's quarter in such a position as to show that he was very much down by the bows and with a nasty list to starboard. Then with a shudder the U-boat sank.

For 25 minutes, on another day, a British and German submarine played hide and-seek, each maneuvering for position to sink the other. Our boat eventually got her position and sent out a torpedo, which narrowly missed. Eight minutes later a second torpedo struck the enemy close to his stern, which, a few seconds afterwards, was seen to come clear out of water with smoke hanging round it. Then the conning-tower appeared, and the U-boat took a sudden perpendicular dive.—*London Times*, 25/6.

FEWER SUBMARINES IN THE CHANNEL.—The following semi-official statement was issued to-day:

Submarine activity has much diminished in the western and central areas of the English Channel since the British naval forces succeeded in bottling up the ports of Zeebrugge and Ostend, and since the aerial squadrons completed by their bombardments the disorganization of these bases. It seems, moreover, that the total number of submarine attacks has been considerably diminished, which is to be explained by the severe losses inflicted on the enemy in the course of the last months.—*Reuter.*—*London Times*, 15/6.

DESTROYERS IN FIGHT OFF BELGIAN COAST.—Four British torpedo-boat destroyers fought a long-range engagement with a German destroyer force off the Belgian coast on Thursday evening. The action was broken off

before any decisive results were attained. An official statement issued to-day by the British Admiralty recounting the affair says:

"On the evening of June 19 four of our destroyers while patrolling off the Belgian coast sighted eight enemy torpedo-boat destroyers. Our destroyers proceeded on an easterly course at full speed, engaging the enemy at long range.

"After the action had lasted a quarter of an hour the enemy was joined by three more torpedo boat destroyers, whereupon our force fell back on their supports. The enemy did not follow, and the action was then broken off. No damage was sustained by any of our vessels."

Berlin.—The Admiralty to-day announced that German torpedo craft of the Flanders flotilla engaged British destroyers on the evening of June 27 off Ostend. The clash took place while the Germans were on patrol.

Hits it is stated were observed on two of the enemy destroyers. The British destroyers, it is added, withdrew after an engagement of a half hour, steaming out of sight at high speed through an artificial fog. The Germans sustained no casualties nor damage to their craft. The admiralty statement reads:

"On the evening of the 27th portions of our Flanders torpedo forces when patrolling off Ostend were engaged with British destroyers. After half hour's fight the enemy destroyers withdrew, escaping out of sight by developing fog.

"Hits were observed on two of the enemy destroyers. Our boats returned to their bases without loss or damage."—*Sunday Star*, 30/6.

SEAPLANE FIGHT NEAR HELIGOLAND; ONE HUN DOWN.—German airplanes attacked a British naval squadron north of Heligoland Bight on June 19, the British Admiralty announced to-day. The German machines made no hits and one seaplane was destroyed. The text of the Admiralty statement follows:

"A British squadron while on reconnoissance north of Heligoland Bight on the morning of June 19 was attacked by German airplanes. No hits were made by the enemy. One enemy seaplane was brought down and destroyed by gunfire."

The official statement on aerial operations to-night says:

"Low clouds and rain interfered with flying on June 19 and the enemy aircraft showed little activity.

"Nine German machines were destroyed during the day and two were driven down out of control. One of our machines is missing."—*N. Y. Herald*, 21/6.

TWO BRITISH SUBMARINES DAMAGED, BERLIN SAYS.—Two British submarines were badly damaged by bombs and machine-gun fire during an encounter with German seaplanes on Saturday afternoon off the mouth of the Thames, according to an official statement issued at Berlin. The statement reads:

"Two squadrons of seaplanes severely damaged British submarines *C-35* and *C-51* by bombs and machine gun fire off the mouth of the Thames Saturday afternoon. Enemy destroyers endeavored to tow in the submarines, but the *C-35* when last seen, was in a sinking condition."—*N. Y. Herald*, 10/7.

BRITISH SUBMARINE DAMAGED.—A British submarine was slightly damaged and one officer and five men were killed when the craft was attacked by German seaplanes off the east coast of England on July 6, according to an Admiralty statement issued to-day. The text of the statement reads:

"A British submarine was attacked off the east coast of England on July 6 by five enemy seaplanes, which dropped bombs and directed machine gun fire at the boat. One officer and five men were killed. The submarine, slightly damaged, was towed back to her harbor."—*N. Y. Herald*, 10/7.

GERMAN SHORE BATTERIES DESTROY U. S. MOTOR LAUNCH.—The Navy Department has been advised that motor launch *No. 3429*, after assisting a French destroyer to tow an American seaplane, came within range of German shore batteries and was immediately fired upon and sunk. Men of the crew, with life conveyances, began swimming toward shore. Three were picked up on the Allied shore unhurt but exhausted. Assistant Surgeon Albert Mason Stevens, United States Naval Reserve force, and Philip Goldman, quartermaster, second class, were only able to make shore on the German side, and they were seen to have been taken prisoners by German soldiers. The other two members of the crew, Charles Joe Tatulinski, seaman, second class, United States Navy, and John Peter Vogt, seaman, second class, United States Navy, are unaccounted for.

Albert Mason Stevens, assistant surgeon, United States Naval Reserve force. Mrs. Katherine S. Stevens, wife, 2226 Loring Place, New York City.

Philip Goldman, quartermaster, second class, United States Navy. Julius Goldman, father, 234 East One Hundred and Sixteenth Street, New York City.

Charles J. Tatulinski, seaman, second class, United States Navy. John Tatulinski, father, 6215 Fullerton Avenue, Cleveland, Ohio.

John Peter Vogt, seaman, second class, United States Navy. Mrs. Albertine Brown Vogt, mother, 3042 North Rampart Street, New Orleans, La.—*Official Bulletin*, 13/7.

U-BOAT DIES IN 40 MINUTES.—Within 40 minutes recently a British submarine accounted for a German U-boat. The story in brief is:

10.30 a. m.—Sighted enemy submarine, so dived and altered course.

10.47 a. m.—Enemy picked up in periscope.

10.50 a. m.—Again altered course.

10.52 a. m.—Stern tube torpedo fired.

10.53 a. m.—Sharp explosion heard.

11.10 a. m.—Came to surface and sighted oil right ahead with three men swimming in it. Two were picked up, but the third sank before we could reach him. Dived. Survivors stated that submarine *U*— was hit just before the conning-tower.—*Washington Evening Star*, 15/7.

U. S. NAVAL FLYER, MISSING MONTH, IS GERMAN PRISONER.—Ensign George Roe, of Scituate, Mass., an aviation pilot in the American Navy, has been captured and is imprisoned at Camp Landschut, Germany, the Navy Department was advised to-day by Vice Admiral Sims.

Ensign Roe was last heard from in a cablegram from Admiral Sims on June 4. He had made a forced landing 18 miles off the coast of Holland, when his seaplane developed engine trouble.

The account of Roe's experiences, which came by mail, says he left England on a long distance reconnoissance fight along the enemy coast, piloting a British seaplane. He was accompanied by another machine. Arriving eight or ten miles off shore, his machine developed engine trouble and he was forced to alight on the water after signalling his comrade that he would make repairs and follow him.

Soon afterward, two enemy seaplanes were sighted and the British machines gave battle. When few shots had been exchanged the Germans flew away in the direction of the German coast. Returning, Ensign Roe's companion could not locate him, and he was forced to return to his station because of a shortage of gasoline.

At eight o'clock that night a pigeon arrived at the royal air force station bearing this message from Roe:

"On water, attacked by three Huns."

This was the last information from him until it was ascertained he was a prisoner. Roe on January 2 was detailed from the naval air station at

Pensacola, Fla., for duty with the naval aviation forces in France.—*N. Y. Herald*, 6/7.

BRITISH MINE FIELDS IN NORTH SEA.—*Grip on German Navy.*—Some anxiety has found expression in the neutral press about the British prohibited zones in the North Sea, and uncertainty appears to be felt regarding the exact location of the mine fields. There should, indeed, be no doubt about the matter, for the Admiralty have defined in the most specific terms the limits of the prohibited and dangerous areas. To make these perfectly clear the annexed chart has been carefully prepared from the information contained in the notices to marines issued by the hydrographer of the navy on January 3 and April 26 of this year.

It will be unnecessary to repeat the information given in the Admiralty announcements in which the limits of the areas are defined by lines drawn between specified parallels of latitude and meridians of longitude; the shaded portions on the chart speak for themselves. It will be seen that there are three marked areas of varying shapes and different extent, placed in such a manner that while one bars the southern exit from the North Sea and another the passage between Scotland and Norway, the third makes egress from the Heligoland Bight difficult and dangerous. The position of the mine fields has not invariably been depicted with accuracy in the plans shown in British and American papers, and to this circumstance may be due the apprehensions of the neutrals. The actual location and limits of each danger zone as given in *The Times* from the hydrographic notices should afford a fair warning to the peril attending those who stray into these zones instead of using safer routes. If mines are found elsewhere, as in the Kattegat or in the waters between the Skaw and the coasts of Norway and Sweden, these must have been laid by Germany. While this country has taken every reasonable precaution to lessen inconvenience and risk to neutrals when she has made provision for her own security, Germany has strewn her destructive machines broadcast with a total disregard of the laws of nations and the dictates of humanity.

It will be instructive to trace the progress by which the British Government has been brought to the inevitable stage of mine warfare imposed on it by the action of the enemy, and to consider in what respect the measures which have been taken may affect the action of the German Navy. These vast mine fields must offer considerable restriction to all movements in the North Sea, and should to a large extent hamper the egress of the Germans from their ports in the Bight and on the Belgian coast. The Southern mine field and the barrage at the Dover Straits serve as a protection to the entrance to the Thames, and block the way to the English Channel. At least, it should have become necessary for enemy underwater as well as surface craft to move more cautiously in those waters. The great mine barrier completed this month supplies a similar obstruction to the wider passages of the ocean pathways round the north of Scotland. It should make it particularly risky for submerged vessels of all sizes and types to attempt to follow this route. At what cost it has been prepared, and in what number of mines has been used in its construction, has not been revealed.

The grip on the German Navy is made more comprehensive and complete by the third mine field, originally laid during the third year of the war, but the limits of which were readjusted and modified last January. This extends from the neighborhood of the Dutch coast to that of Denmark, and encloses as it were by a deep semi-circular dangerous zone the waters of the Bight. The measure thus taken, while it was far from blocking the exit of the High Sea Fleet from its defended ports, reduced the military value of the German mine fields and hampered the movements of the enemy vessels in that area. It restricted the excursion of the submarines, although it did not prevent the main fleet from putting to sea, but in every way it controlled the German freedom of action. Taken in conjunction with the other mine fields north and south, any attempt on the part of the

German submarine to reach the Atlantic is made more difficult, and as all vessels must more or less keep to the routes and channels left clear the work of the British patrols should be considerably simplified. It is possible, of course, to sweep a passage through any mine field, but this is not speedily done, is a very risky operation in face of an alert, powerful force, and in the case of the northern mine field, so far from the German ports,

THE BRITISH MINE AREAS.

should be exceedingly hazardous. To make assurance doubly sure, the Admiralty have given notice restraining the movement of all vessels in the routes and channels which have been left clear northwards for merchantmen. Virtually all traffic through the passage northwards is to be suspended after dark under stringent regulations and at great risk to those who disregard the clear instructions of the authorities. Altogether the measures now taken appear to have been broadly conceived, and indicate that restraint will be vigorously applied.

The policy of laying mine fields and defining prohibited areas was not pursued by this country until some time after the outbreak of war. When the *Amphion,* was destroyed by a mine, dropped by the *Konigen Luise,* Mr. Churchill said that the Admiralty were not at all alarmed or disconcerted by such incidents, as they have been expected and were prepared for, but, at the same time, he strongly deprecated the methods of the enemy in scattering these machines indiscriminately about the sea. On August 23, 1914, the Admiralty announced that, while reserving to themselves the utmost liberty of retaliatory action against this new form of warfare, they had not so far laid any mines during the war. It was not until October in that year that the Admiralty felt compelled to establish a mine field at the southern end of the North Sea, and, in announcing it as a counter measure, described its limits, which roughly ran from the Belgian coast to the Goodwins. It is now known that the mines used at that time were not sufficiently effective or powerful, nor were the old cruisers which had been fitted as mine-sowers before the war fast enough for their purpose. By the spring of 1915 these deficiencies had been to a large extent, remedied, but for some reason or another the Admiralty, though strongly urged to mine the North Sea, abstained from any further steps in this direction. It was not, indeed, until further changes took place at Whitehall that the policy of mine-laying commended itself to those in authority, with the result which has already been described.—*London Times,* 5/27.

TRANSPORTS SUNK BY SUBMARINES.—*British Ship Carpathia Hit Off Irish Coast.*—The British steamer *Carpathia* was torpedoed in the Atlantic on Wednesday, it was announced here to-day.

The *Carpathia* was sunk off the Irish coast as she was bound out. Very few persons were on board her.

The *Carpathia* sank after she was torpedoed, according to the *Central News.*

Three torpedoes were fired at the *Carpathia* and all hit the vessel. Splendid discipline was maintained. The survivors were in the water two hours, the Exchange Telegraph Company says, when picked up by the steamer which brought them into port. The *Carpathia* disappeared very quickly.

Five persons were killed in the Cunard liner, through a torpedo entering the engine room. The remainder of those on board took to the life boats. All the passengers on the *Carpathia* were saved. They include 36 saloon passengers and 21 from the steerage.

The British transport *Carpathia,* 13,603 tons gross, has been sunk by a German submarine off the Irish coast while outward bound from a British port, it was learned here to-day.

The *Carpathia* was owned by the Cunard Line. Prior to the war she was engaged in transatlantic service.

Although in the service of the British Government for several months, the *Carpathia* has been used as an American troop transport. Her last departure from an American port was in June. The *Carpathia* was built in 1903 at Newcastle, England.

It was the *Carpathia* which answered the wireless S. O. S. call of the White Star Liner *Titanic* in April, 1912, when that vessel hit a submerged iceberg on her maiden voyage to New York and was sunk with heavy loss of life. The *Carpathia* picked up and landed at New York 866 survivors of the *Titanic.*

The *Carpathia* was also one of the first merchant steamers to appear in American waters armed against submarines.—*Balto. American,* 20/7.

TRANSPORT "BARUNGA" LOST.—The British transport *Barunga* has been sunk by a submarine, the Admiralty announced this afternoon. There were no casualties.

The Admiralty statement reads:

"The transport *Barunga,* formerly the German steamer Sumatra, outward bound from Australia with unfit Australians on board, was torpedoed

and sunk by a German submarine on Monday. There were no casualties."

There was not the slightest sign of panic when the *Barunga* was torpedoed. The 700 unfit troops aboard lined up as though on parade until taken off. Aid speedily arrived. The transport remained afloat nearly an hour after she was attacked. The *Barunga* was a steamer of 7484 tons gross, built in Flensburg in 1913. She was 482 feet long, 62 feet beam and 29 feet depth. She was owned by the British Government.—*Balto. Sun*, 20/7.

BALTIC AND KATTEGAT

MINING OF THE KATTEGAT.—With reference to British mines in the Kattegat and the unfounded allegation that British mines had been laid in Swedish territorial waters, the British Minister at Stockholm announces that British mines were laid out in the Kattegat in April in order to destroy German submarines. No mines, however, were laid down at less than 35 feet under the surface, and consequently they are not dangerous for ordinary commercial shipping.

On the other hand, the British naval authorities have learned that a German light cruiser, accompanied by destroyers, between May 12 and May 15 operated east of the Skaw and evidently spread out mines.

The British naval authorities point out in the most decisive manner that no British mines have been laid in Swedish territorial waters.—*Exchange Telegraph Company.—London Times*, 17/6.

MEDITERRANEAN

FRENCH TRANSPORT SUNK.—A Paris dispatch states that on the night of May 10-11 (believed to mean June 10-11) the transport *Santa Anna*, from Bizerta for Malta, was torpedoed and sunk. Of the 2150 soldiers and native workmen on board 1512 were saved.—*Literary Digest*, 6/7.

U-35's RECORD TOLL OF SHIPPING.—The German submarine *U-35*, commanded by Captain Arnauld de la Perrière, had sunk 196 vessels in the Mediterranean, aggregating 500,000 tons. Further particulars are now at hand regarding these sinkings, which took place in a period of two and a half years. The *U-35* destroyed in 30 months' time 2 warships, 1 auxiliary cruiser, 5 transports, 124 freight steamers, 62 sailing vessels, and 2 fishing craft.—*Nautical Gazette*, 29/6.

ADRIATIC

AUSTRIAN DREADNOUGHT IS BELIEVED TO HAVE BEEN SUNK.—The suspicion increases that the Austro-Hungarian dreadnought *Prinz- Eugen*, torpedoed by Commander Rizzo and Ensign Aonzo at the same time that the *Szent Istavan* went to the bottom, followed her sister ship.

Aviators report that the ship is absent from all Austrian ports offering a safe anchorage. Moreover, this fact is significant that aviators flying over the Adriatic three hours after the torpedoing saw, 42 miles north of the spot where the *Szent Istavan* went down a second large vessel sunk. The best hypothesis is that the *Prinz Eugen* strove to reach Pola and sank midway.

Of the four Austrian dreadnoughts only the *Viribus Unitis* remains. Of the smaller ships the Austrians have lost the *Wien*, have had to transform the *Budapest* into a hospital ship, and had the *Ersherzog Franz Ferdinand* damaged when Commander Pellegrini sank the dreadnought *Tegethoff* in Pola harbor.

The sinking of these ships by a handful of Italian heroes has vastly diminished the importance of the Russian Black Sea Fleet. The Germans, even though they should manage to appropriate the latter, will be inferior in strength to the Allied Mediterranean forces.—*Sunday Star*, 30/6.

BLACK SEA

RUSSIA'S FLEET.—The advantages acquired by our enemy through the collapse of Russia include the ships of war which might fall into her hands in the Black Sea. This is a subject which has been ably dealt with recently by Mr. Arthur Pollen, who shows the additions which they would make to the German Fleet, unless they are destroyed or seriously damaged by their Russian crews, who, however, seem to be too apathetic and demoralized to take any steps to prevent the ships falling into German hands. The four powerful dreadnoughts, the *Poltava Sevastopol, Petropavlovsk,* and *Gangoot,* which had been laid down in 1911, were in full commission shortly after the declaration of war; in 1912 or 1913 four battle cruisers, *Borodino, Somail, Kinburn,* and *Navarin,* were laid down and were near completion when the revolution broke out. In addition to these vessels there are two modern light cruisers of 4000 and 5000 tons with a speed of 27 knots, and four others of larger size were laid down and due for completion by 1916, which should have been ready for sea a year ago. Besides these vessels there are two pre-dreadnoughts and two protected cruisers of some value. "Hardly less important to the vessels named above," says Mr. Pollen, "are the destroyers of the 1912 programme, 36 in number, all of which I believe were at sea early in the war."

This sketch of the Russian Baltic Fleet shows that, assuming the ships to be captured intact, they would be an important addition to the German Baltic Fleet of 24 ships, and if the battle cruisers are available, they would be an even more welcome supplement, for it would double the German battle cruiser squadron now supposed to consist of only four vessels. These additions to the German fleet would go far towards equalizing the rival navies in the North Sea; but the Allied Naval Council, we may be sure, will take care that our naval superiority is maintained beyond a peradventure, to use an expressive Americanism, and in the United States Fleet we have an important reserve.—*United Service Gazette.*

RUSSIAN SHIPS IN THE BLACK SEA.—It appears from news published in German newspapers that the two Russian ships which got away from Sebastopol before the arrival of the Germans are dreadnoughts. They are the *Volia* and *Svobodnaya Rossya,* which were respectively called *Alexander III* and *Empress Catharine II* before the Revolution, and were laid down in Black Sea yards in 1911. They, therefore, constitute a naval force to be reckoned with, the spirit in the Russian Black Sea being against the Germans, as it has been all along. What the enemy is discovering is that these ships are a serious obstacle to the resumption of free and uninterrupted sea transport in these waters, so necessary to the exploitation of the Ukraine as well as to the development of German plans for extending German influence into the heart of Asia. In the meantime the Russian Government has made a protest against "flagrant" violations by the enemy of the Brest-Litovsk Treaty in the Black Sea. From it one learns that a "U-boat" is "on guard" before Novorissisk, in the harbor of which lie the *Vola* and *Svobodnaya Rossya.* Above them, too, fly low enemy hydroplanes. How long will this tragi-comedy be played? The Russian Government will do better to use the ships and batteries at Novorissisk in destroying the symbols of German watchfulness and power than in appealing to the first clause in the Treaty of Brest-Litovsk, to the effect that "Russia and Germany have decided to live in the future in friendship and harmony."—*Army and Navy Gazette,* 8/6.

The *Volia* and *Svobodnaya Rossia* were two of three dreadnoughts known as the *Volia* class. They carry 10 or 12 12-inch guns, and were laid down in September, 1911. The *Svobodnaya Rossia* (originally called *Empress Catherine II*) has a displacement of 24,000 tons, and the *Volia* (originally the *Emperor Alexander III*) a displacement of 22,435 tons. They

were built at Sebastopol and Nikolaieff respectively, and are fitted with Parsons turbines and Yarrow boilers.—*London Times*, 30/5.

SOVIET WANTS THE BLACK SEA FLEET.—The Ukrainian delegates at the Russo-Ukrainian peace conference in Kieff demanded that the Russian Black Sea fleet participate with Germany against the Allies. This demand was supported by Mr. Maximoloff, the Ukrainian Minister of War.

The Soviet Government's delegates rejected the demand, and semi-official advices received in Moscow say that Mr. John Joffe, the Soviet ambassador in Berlin, and the Bolshevik commander of the Black Sea fleet, Sablin, have been advised that Russia will not consent.—*N. Y. Herald*, 20/6.

RUSSIA SURRENDERS BLACK SEA WARSHIPS.—*German Ultimatum Accepted.*—The news circulated yesterday by the wireless stations of the Russian Government included a communication from M. Trotsky to the chief commissary of the fleet at Novorossisk ordering the return of the Black Sea fleet to Sebastopol by June 10 [Monday last].

M. Trotsky explains that in a note of May 23 Herr von Kühlmann categorically demanded the return of all Russian ships from Novorossisk to Sebastopol. If they returned German troops on the Ukrainian front would not advance over the boundary line, and after the conclusion of a general peace the ships would be returned to Russia. In an ultimatum sent on June 5 Herr von Kühlmann agreed to guarantee that before a general peace was concluded Germany would not use the ships, and as their return was "a fundamental condition of all further agreements between Germany and ourselves for the cessation of hostile action and for negotiations," their return was ordered.

In a message to M. Yoffe at Berlin M. Tchitcherin complains that German troops have crossed the boundary line [from the Ukraine] and had attempted to cut up the Tsaritsyn railway.—*Admiralty, per Wireless Press.—London Times*, 14/6.

WASHINGTON FEARS RUSSIAN FLEET IS NOW GERMANY'S.—A new and important phase of the problem of intervention in Russia was disclosed to-day by the admission of officials of the Navy Department that much apprehension exists among the Allied governments over the fate of the Russian Navy.

By extending her domination Germany has not only opened the way to new resources in men and supplies but probably has profited by the acquisition of the Russian Navy.

What this means may be gathered from the fact that Russia, in spite her isolation from the high seas in the west, has ranked next to Japan as a naval power.

If Germany has succeeded in obtaining possession of the Russian fleet, built and building, among them ships of the most modern type, her strength has been augmented 25 per cent. With the additions which have been made to the German Navy since the beginning of the war from German shipyards it will outrank that of the United States.

This possibility is one of the disturbing elements in the calculations of the Allied naval strategists. Since the collapse of the Kerensky régime and the setting up of the Bolshevik Government constant efforts have been made to ascertain the fate of the Russian Baltic and Black Sea fleets, but in the wave of turbulence that has swept over Russia these have been unavailing. There have been reports from time to time that some of the Russian ships have been sunk by their crews to prevent them from falling into German hands. There also have been reports that negotiations were afoot between German agents and Bolshevik representatives for the sale of the Russian ships. There have even been reports that the vessels have been recalled to safe havens by the Bolsheviki. What actually has become of them is unknown. The supposition is, however, that they, or a large

number of them, have come into the possession of the Germans and are to be reckoned with henceforth as parts of the German fleet.

Navy Department officials were disposed to-day to accept the optimistic statement of Sir Eric Geddes on the submarine situation. Concerning the German capacity for turning out submarines there is much uncertainty. There are a variety of reports, the extreme rates of launchings ranging from five a day to three month. Whatever the actual rate of construction may be American naval officials reflect the British point of view, that although constant vigilance may be required, the threat of the submarine menace will not interfere with the prosecution of the war.—*N. Y. Herald,* 12/7.

"MEDJHIDIEH" RESTORED TO TURKS.—The Turkish cruiser *Medjhidieh,* which was sunk by a mine on April 3, 1915, outside of Odessa, and subsequently raised by the Russians and incorporated in the Russian fleet, left Odessa in the early part of May for the purpose of rejoining the Turkish naval forces of which it will again form a unit.—*Nautical Gazette,* 29/6.

PACIFIC

JAPANESE BATTLESHIP BLOWS UP.—*Five Hundred Members of the Crew of 960 Officers and Men Lose Their Lives.*—The Japanese battleship *Kawachi,* of 21,420 tons displacement, blew up and sank in Tokoyama Bay, 150 miles northwest of Nagasaki on July 12. Five hundred members of the crew lost their lives.

The battleship *Kawachi* was built in Kure in 1912. She carried a complement of 960 officers and men. The warship was 500 feet long, 84 feet beam and drew 28 feet of water. Her armament consisted of twelve 12-inch guns, ten 6-inch guns, eigth 4.7-inch guns and twelve 12-pounders. She also was equipped with five 18-inch torpedo tubes.—*Balto. American,* 17/7.

U-BOATS AND SHIPPING

ALLIES NOW HAVE SUFFICIENT SHIPS—The opinion expressed by Vice Admiral Sir Rosslyn Wemyss, First Sea Lord of the British Admiralty, to the Associated Press last week that the submarine activity of the Germans off the Atlantic coast of the United States should not be taken very seriously, as the Germans probably would not attempt to block the American shores, resulted to-day in the following statement being issued at American naval headquarters:

"The activity of the German submarines on the American coast is a manifestation of the failure of the enemy's submarine campaign. The enemy has a limited number of submarines, and his only chance of employing this available number successfully is to concentrate their operations on the focal points of Allied trade. All shipping which supplies the Allied armies must converge in the areas in the vicinity of England and France.

"Every submarine which operates far afield, as off the extensive coast of America, simply means less losses to the Allies, because it is one less submarine where shipping is heavy and therefore harder to protect. If the Allies could in any way influence the enemy they would encourage him to send his submarines to these areas distant from the critical areas.

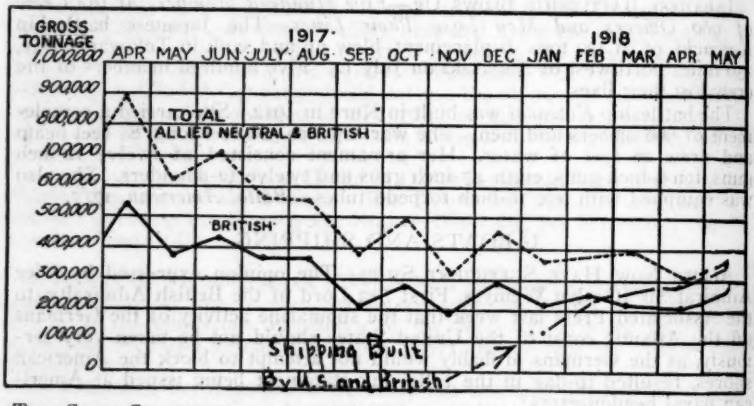
"Such activities will, of course, result in the loss of some ships—losses will undoubtedly go on until the end of the war. What we are concerned about is whether the losses the enemy inflicts are critical—are more than we can stand. As long as they are kept below the critical stage they could go on indefinitely and not affect the war.

"The situation to-day is that there is sufficient tonnage available to meet the Allied demands and it is constantly growing larger. At the present rate of construction it will continue to grow larger even if the submarine losses increase. The enemy's high command knows these basic facts only too

well, as is evidenced by their desperate attempts to force a decision on land before the full weight of American intervention can be brought to bear.

"From the enemy press it is evident that these futile submarine raids in remote areas, such as raids on the American coast, the bombardment of Monrovia and the activities in the Azores, cannot have any effect on the outcome of the war and are carried on to deceive their own public as to the submarine campaign. The German public is led to believe by cleverly constructed press accounts that their submarines operate at pleasure in all parts of the world. The fact remains that the Allies have command of the seas—subsurface as well as surface."—*Evening Star*, 19/6.

HOW THE U-BOAT IS BEING DEFEATED.—The accompanying diagram, showing a year's decline in shipping losses due to U-boat piracy, is based upon one which was issued by the British Admiralty with the last monthly returns of losses of British, Allied and neutral merchant tonnage "due to enemy action and marine risk." The diagram covers the year from April, 1917, when the ruthless U-boat warfare started, to May, 1918. The state-



THE SLOW STRANGULATION OF THE U-BOAT CAMPAIGN IN ITS FIRST YEAR.

ment for April of this year shows that the losses reached a total of 305,102 gross tons, of which 220,709 tons were British and 84,393 tons were Allied and neutral ships. These April figures show a decrease of 94,371 tons compared with the preceding month of March, and a decrease of 588,775 tons compared with April, 1917, when the German U-boats struck their heaviest blow. It will be noted that the average fall in the rate of sinkings was rapid at first and later was not so marked; although it is still proceeding. It should be noted, moreover, that the reduction in losses has been far more rapid for Allied and neutral ships than it has for British.

Of great interest in connection with this diagram is the recent announcement by the Secretary of the Ministry of Shipping of the total tonnage of steamships of 500 gross tons and over that have entered and cleared ports of the United Kingdom, from and to ports overseas. For the present year the total in gross tons for January was 6,336,663; for February it was 6,326,965; for March, 7,295,620 tons, and for April, 7,040,309 tons. It should be noted in connection with these figures that they embrace all United Kingdom sea-borne traffic other than coastwise and across channel.—*Scientific American*, 22/6.

CONVOY SYSTEM CUTS U-BOAT TOLL TO ONE PER CENT.—*Sinkings Since January, 1917, Less Than 1.29 Per Cent, Says Sir Leo Money.*—London, Tuesday.—Speaking in the House of Commons to-day Sir Leo Money, parliamentary secretary to the Ministry of Shipping, said the percentage of vessels lost while homeward bound to the United Kingdom since January 1, 1918, was rather more than one per cent. The losses of food vessels for the same period was less than 1.4 per cent.

The result of the convoy system, Sir Leo said, continued to improve. Since January, 1917, when the system was put into effect, 42,000,000 gross tons had been convoyed to British and French ports with a loss up to June 29 of 1.29 per cent. This includes loss by the dispersal of convoys through bad weather.—*N. Y. Herald*, 7/10/18.

OUR ANTI-SUBMARINE ACTIVITY.—Information is imported from an authoritative source that there are now between 4000 and 5000 vessels of various types operating against the German submarine, and of these craft this country has furnished only a small percentage. The destroyer continues to be the main reliance against the enemy submarine warfare, and every effort must continue to be made in producing as many of these boats with as little delay as possible that we may do our part in driving the submarine from its fields of operation. Vice Admiral Sims has estimated that the Germans are able to keep not above 10 per cent of their U-boat fleet in action on the average, which means until recently anywhere from 15 to 20 submarines actually at work in the Atlantic, North Sea, and the English Channel, and in the last few months these figures have been greatly reduced. That officer entertains no apprehension that the submarine will accomplish anything worth while by the invasion of American waters and believes there is still less likelihood of bombardment of seacoast cities, which would be suicidal. The Germans are finding it increasingly difficult to achieve anything which can be regarded as profitable from the military point of view on account of the operation of the submarines, and it is Vice Admiral Sims' theory that the enemy will shortly abandon this phase of warfare. The most effective means of combating the submarine remain the adoption of the convoy system, the development of an efficient depth charge, and the invention of devices which would enable surface vessels to follow the submerged submarine by sound.—*Army and Navy Register*, 6/7.

U-BOAT LOSSES.—A Paris dispatch states that the Under-Secretary of the navy, in a statement to the Deputies, declared that two-thirds of the German submarines launched are already at the bottom of the sea, and that they are being destroyed twice as fast as they are built.—*Literary Digest*, 6/7.

BRITISH AND U. S. HALF-YEARLY SHIP OUTPUT.—The British Admiralty announced last week that during June 134,159 gross tons of merchant shipping were completed in the United Kingdom yards and entered for service. The record of British shipyards for June fell below that of May, when a total of 197,274 gross tons was entered for service. That was the highest figure for any month during the last year. In June steel and wood ships totalling 280,400 deadweight tons were completed and delivered in the United States to the Shipping Board. Of the June output, steel ships total 262,900 tons and wood 17,500 tons. This is a new record of production for the United States, and comes within 15,000 deadweight tons of the world's record for any one month made by the British yards in May.

The June production for the Shipping Board exceeds that of May, the previous high mark in American shipbuilding, by 21,159 deadweight tons.

Comparative figures in gross tons on ship construction in the United States and the United Kingdom during the first six months of the present year are as follows:

1918	United States	United Kingdom
January	64,795	58,568
February	117,601	100,038
March	117,145	161,674
April	163,050	111,533
May	194,464	197,274
June	201,425	134,159
Total	888,480	763,246

VESSELS REPAIRED IN BRITISH YARDS.—The coordination of British ship repair yards resulted in restoring to service from August 3, 1917, to April 25, 1918, an aggregate of 16,150,000 gross tons of shipping. In accomplishing this feat the greatest economy of resources has been observed and not a stroke of work has been done on a vessel in dock that could be done afloat. Labor and material were also economized to the greatest possible extent and only work of an imperative necessity to refit the vessel for sea service was carried out.—*Marine Journal*, 29/6.

BRITISH SALVAGE.—Operations under the navy are raising many merchant ships sunk in shoal water.—*The Engineer*, 21/6.

WAR'S TOLL OF NEUTRAL SHIPPING.—The Liverpool *Journal of Commerce* has attempted to compute the number of neutral ships sunk through war's causes up to March 31, 1918. According to its tabulation, German submarines were responsible for the sinking of the following neutral vessels:

	1915	1916	1917	1918 (3 mo.)
Norway	49	176	379	31
Sweden	18	48	51	7
Denmark	16	46	104	6
Holland	2	10	44	4
Greece	5	30	55	..
Spain	2	18	27	14
United States	1	3	7	..
Brazil	..	1	4	..
Peru	..	..	1	..
Argentina	..	..	3	1
Uruguay	..	..	3	..
Total	83	327	680	63

Of the 1153 ships mentioned in this table, Norway has lost in all 635 ships. Denmark 172, Sweden 124, Spain 66, Holland 60, and Greece 55. In the case of the United States only the eleven vessels are included which were sunk prior to the time diplomatic relations with Germany were broken off. Apparently American vessels sunk, after that date and prior to our actually declaring war against Germany, have been included by the British authorities in the list of Allied shipping lost.

In addition to the above sinking by submarines, 184 neutral vessels have been sunk by mines, Norway again being the heaviest sufferer, with 70 vessels. Neutral vessels have also been sunk to the number of 27 by the action of enemy cruisers and raiders. The number of neutral ships which have perished by enemy action by submarine, mine, and cruiser enemy attack, up to March 31, 1918, amounts, therefore, to 1364, aggregating 2,131,521 gross tons.—*Nautical Gazette*, 6/6.

HEAVY U-BOAT LOSSES.—The latest information to reach this country through neutral sources shows that the effectiveness of the anti-submarine operations undertaken by the Allied navies is being brought home daily to the German naval authorities.

Not a week passes—according to a Scandinavian correspondent—without submarines failing to return to their bases, while others stagger home badly damaged. In one month alone a large number of submarines failed to return to their bases, while at one port no fewer than six vessels returned so badly damaged that they had to be drydocked immediately and practically refitted—work which took so much time as to cause congestion in that particular area. The correspondent also states that the condition, physically and mentally, in which the crews return has caused considerable anxiety. According to a report in the *Munchner Neuste Nachrichten* of a lecture by Commander Rose, whose name as a German submarine commander is well known, the lecturer stated that the moral effect of the British "wasser bomben" (water bombs or depth charges) was great, particularly on an inexperienced crew, in consequence of the "hellish din of their explosion." That is the first German admission of the fact that inexperienced crews are employed on German submarines, but it lends added significance to the statement made by another U-boat commander that a great many of the German submarine losses were due to the fact that many of the crews are not properly trained, some going to sea within six weeks of entering the service. Crews of U-boats admit that the defence of the British Mercantile Marine has improved so considerably of late that an attack by gunfire on a vessel is only undertaken with extreme care. There is a lack of enthusiasm among the U-boat crews, whose *morale* has steadily declined, and has caused considerable anxiety in high German naval circles.

SUBMARINE SUNK BY STEAMSHIP.—After having fought a successful engagement with a U-boat in the morning, a British steamship was attacked the same evening by another German submarine, which she beat off after narrowly escaping being torpedoed. In the first fight the submarine, which was armed with two guns, one fore and the other aft, opened a rapid fire on the steamer, but the shots fell wide. The vessel replied with her single gun, and after her third round saw the submarine submerge. A few minutes later a torpedo passed just under the ship's stern as she was "zigzagging." Then the submarine again broke surface, and, steaming at high speed, reopened fire. The ship's gunners replied and struck the U-boat's conning tower and after gun. Shortly afterwards the U-boat took a decided list, and, rolling heavily, sank in a couple of minutes. Those on board the British steamer thought that one of their shots had struck a vital part and had caused her to founder.—*London Times*, 24/6.

LAST QUARTER SHOWS GREATEST TOLL OF U-BOATS.—Within the past three months the number of German submarines destroyed has been greater than during any similar period since the beginning of the war. Depth charges have played an important part in putting an end to the activities of U-boats.

Details of the sinking of three German submarines, two of them by British submarines, recently became known in London. A British patrol boat on a moonlight night sighted an enemy submarine on the surface about half a mile away. She was apparently recharging her storage batteries.

Dropped Depth Charges.—"Full speed ahead," was the command of the patrol boat captain, but by the time the boat reached the spot the submarine had disappeared. The British craft immediately dropped six depth charges. Quantities of oil came to the surface soon afterward and then cries for help in German were heard. The patrol boat searched for survivors of the submarine, but was able to rescue only one of the enemy.

While on patrol duty "somewhere" off the east coast a British submarine sighted the periscope of an enmy U-boat and started for it under full speed. Before the German could submerge the Britisher had rammed it. The British submarine cut through the plates of the enemy boat and stuck

there. Both boats endeavored to extricate themselves. The German came almost to the surface, carrying the British submarine along. Finally the U-boat got away. She made desperate efforts to keep afloat but finally sank. The British submarine was not damaged.

On another day British and German submarines played hide and seek for nearly half an hour, each maneuvering for a position to attack the other. The Britisher finally fired a torpedo but missed. A few minutes later a second torpedo went home, striking the German close to the stern. With smoke pouring out of the hole made by the torpedo, the stern of the U-boat came to the surface. Then the conning tower appeared. A few seconds and the U-boat took a perpendicular dive leaving a trail of oil and a whirl in the sea, indicating the rush of water into space. There were no survivors.—*Evening Sun*, 19/7.

MILITARY

APPROXIMATE AIRCRAFT FIGURES

Date about June 10, 1918.

Airplanes at front bearing American insignia	378
Planes of American manufacture set up in France	50
American aviators in France	1,746
American aviators fully equipped in France	126
American observers in France	1,800
Enlisted men of air service in France	38,367
Trained aviators in U. S.	3,467
Observers and non-flying officers in U. S.	4,922
Enlisted men in air service now in U. S.	99,001
Capacity of 27 training schools in U. S.	3,500
In training at flying fields	3,394
In training at ground schools	3,393
Men passed by examining boards awaiting admission to ground schools	4,236
In advance training—pursuit, bombing or observation	1,036
In training at schools in France, England, Italy and Egypt	2,500

SCHEDULE OF ORDERS

Primary planes	5,300
Advanced training planes	2,100
Combat planes	11,000
Engines for primary planes	10,200
Engines for advanced planes	6,692
Engines for combat planes	27,300
Propellers	35,913
Balloons	1,077
Bombs	843,735
Machine Guns—	
4 to each combat machine	44,000
Spares and extras	20,000

DELIVERIES FROM AMERICAN FACTORIES

Primary planes	4,365
Advanced plances	620
Combat planes	300
Experimental planes	195
Engines for training machines	6,126
Engines for advanced machines	1,815
Engines for combat machines	1,500
Propellers	13,863
Machine guns	31,146
Balloons	125

—*Aviation*, 1/7.

BRITISH SHOOT DOWN 3856 GERMAN AIRPLANES IN YEAR, WHILE LOSING ONLY 1094.—*Foe's Loss on Western Front is More Than Three to One—Allied Air Superiority Expected to be Even Much More Pronounced as America's Forces Arrive.*—London, Saturday.—In one year on the British Western front the Royal Air Force has accounted for 3233 enemy airplanes. In the same period the naval airmen shot down 623, a total of 3856. An official statement dealing with these operations says:

"The Royal Air Force during the year beginning July 1, 1917, on the British Western front destroyed 2150 hostile machines and drove down out of control 1083. In the same period the air force units working in conjunction with the navy shot down 623 hostile machines.

"During this period 1094 of our machines were missing. Ninety-two of these were working with the navy.

"On the Italian front from April to June, 1918, the British destroyed 165 hostile machines and drove down six out of control. Thirteen of ours were missing.

"On the Salonika front between January and June, 21 hostile machines were destroyed and 13 were driven down out of control. Four of ours were lost.

"From March to June in Egypt and Palestine, 26 hostile airplanes were destroyed and 15 were driven down out of control. Ten of ours were missing.

"In all the theaters of the war the British air superiority and strength progressed rapidly and continuously. From this it is safe to assume that when the new factor of America's output, both aircraft and personnel, enters the situation in the fighting zones the aerial ascendency of the Entente Allies should give them very great advantages."—*New York Herald*, 14/7.

INDEX OF WAR VESSEL LOSSES MENTIONED IN THIS NUMBER

UNITED STATES VESSELS

Schurz (cruiser) 1931
Covington (transport) 1933
No. 3429 (motor launch) 1938
Westover (supply ship) 1934
San Diego (cruiser) 1934

BRITISH VESSELS

Dwinsk (transport) 1931
Llandovery Castle 1932
Carpathia (transport) 1941
Barunga (transport) 1941

FRENCH VESSELS

Santa Anna 1942

JAPANESE VESSELS

Kawachi (dreadnought) 1945

RUSSIAN VESSELS

Medjehidieh (cruiser) (returned to Turks) 1945

GERMAN VESSELS

1 submarine 1929
1 submarine 1930
2 submarines 1932
1 submarine 1934
2 submarines 1936
1 submarine 1938
1 submarine 1949

AUSTRIAN VESSELS

Prinz Eugen (dreadnought) .1942

DIPLOMATIC NOTES

FROM JUNE 18 TO JULY 20

PREPARED BY

ALLAN WESTCOTT, PH. D., Instructor, U. S. Naval Academy

UNITED STATES

PRESIDENT WILSON'S MOUNT VERNON SPEECH

On July 4, before a distinguished assemblage at Mt. Vernon, President Wilson again outlined the Allied aims in the war, which he characterized as a struggle for the reign of law, applicable to nations as to individuals and sustained by the organized opinion of mankind. The ends for which we are fighting he stated as follows:

I. The destruction of every arbitrary power anywhere that can separately, secretly, and of its single choice disturb the peace of the world; or, if it cannot be presently destroyed, at the least its reduction to virtual impotence.

II. The settlement of every question, whether of territory, of sovereignty, of economic arrangement, or of political relationship, upon the basis of the free acceptance of that settlement by the people immediately concerned, and not upon the basis of the material interest or advantage of any other nation or people which may desire a different settlement for the sake of its own exterior influence or mastery.

III. The consent of all nations to be governed in their conduct toward each other by the same principles of honor and of respect for the common law of civilized society that govern the individual citizens of all modern states in their relations with one another; to the end that all promises and covenants may be sacredly observed, no private plots or conspiracies hatched, no selfish injuries wrought with impunity, and a mutual trust established upon the handsome foundation of a mutual respect for right.

IV. The establishment of an organization of peace which shall make it certain that the combined power of free nations will check every invasion of right and serve to make peace and justice the more secure by affording a definite tribunal of opinion to which all must submit and by which every international readjustment that cannot be amicably agreed upon by the peoples directly concerned shall be sanctioned.

These great objects can be put into a single sentence. What we seek is the reign of law, based upon the consent of the governed and sustained by the organized opinion of mankind.

These great ends cannot be achieved by debating and seeking to reconcile and accommodate what statesmen may wish with their projects for balances of power and of national opportunity. They can be realized only by the determination of what the thinking peoples of the world desire, with their longing hope for justice and for social freedom and opportunity.

I can fancy that the air of this place carries the accents of such principles with a peculiar kindness. Here were started forces which the great nation against which they were primarily directed at first regarded as a revolt against its rightful authority, but which it has long since seen to have been a step in the liberation of its own people as well as of the people of the United States and I stand here now to speak—speak proudly and with confident hope—of the spread of this revolt, this liberation, to the great stage of the world itself! The blinded rulers of Prussia have roused forces they knew little of—forces which, once roused, can never be crushed

to earth again; for they have at their heart an inspiration and a purpose which are deathless and of the very stuff of triumph!

MR. ROOSEVELT ON WINNING THE WAR.—In a speech before the New York State Republican Convention at Saratoga, on June 18, Mr. Roosevelt characterized the purpose of the American people as follows:

"The two prime purposes of the American people at this time, having precedence of all others are: First to insist upon the absolute and thoroughgoing Americanization of our entire citizenship, and second, to win the war; to win it as speedily as possible, and to end it by the peace of overwhelming victory, a peace which shall guarantee to us, and to our allies, and to all the well-behaved nations of the civilized world, lasting relief from the threat and horror German world dominion."

Regarding our aims in the war, Mr. Roosevelt continued:

"There must be no peace until Germany is beaten to her knees. To leave her with a strangle-hold on Russia, and through her vassal allies, Austria, Bulgaria, and Turkey, dominant in Central Europe and Asia Minor, would mean that she had won the war and taken a giant stride toward world dominion. Belgium must be reinstated and reimbursed; France must receive back Alsace and Lorraine; Turkey must be driven from Europe, Armenia made free, the Syrian Christians protected, and the Jews given Palestine. Italian-Austria must go to Italy and Rumanian-Hungary to Rumania. Moreover, we must raise against the German menace the sleeping sword of the Slavs of Central Europe; we must establish the great free commonwealths of the Poles, the Czechoslovaks, and the Jugo-Slavs, and save the other submerged peoples who are their neighbors. Unless we do all this, unless we stand by all our allies who have stood by us, we shall have failed in making the liberty of well-behaved, civilized peoples secure, and we shall have shown that our announcement about making the world safe for democracy was an empty boast.

MEXICO THREATENS AMERICAN OIL INTERESTS.—On June 29 Secretary Lansing made public the original text of a Note addressed last April by Ambassador Fletcher to the Mexican Government protesting against that government's taxation of oil lands and oil contracts to an extent regarded by the United States as virtually confiscatory. By the publication of this Note the United States emphasized its purpose to protect firmly the rights of its citizens in Mexico.

The chief investors in and producers of oil in Mexico are Americans and British, who hold oil interests in Mexico to the amount of about $300,000,000. In February, 1916, President Carranza issued a decree, described as a tax law, providing that land owners should pay cash rent and royalties to the Mexican Government for developing their own lands. The Note calls the attention of Mexico "to the necessity which may arise to impel the United States Government to protect the property of its citizens in Mexico divested or injuriously affected by the decree above cited."

FOOD EXPORTS TO MEXICO.—Notification that the United States Government would permit free exportation to Mexico of certain foodstuffs under certain restrictions and under the direction of the Federal Food Administration was presented to the Mexican Government on July 10 through the American Embassy.

The notification made it clear that the United States expected that the Mexican Government, in return, would permit exportation to the United

States of articles not needed by Mexico, and also guarantee that imports from the United States would not be re-exported.

The action of the American Government is explained as its method of giving proof of the sincerity of the declarations of friendship for Mexico which were made by President Wilson in his address to Mexican editors in Washington early in June.—*N. Y. Times*, 11/7.

GREAT BRITAIN

IRISH CONSCRIPTION DELAYED.—On June 25, Premier Lloyd George in a speech before the House of Commons practically admitted that the government had given up its purpose to grapple immediately with the Irish problem. He stated that before enforcing conscription, it was the government's intention to set up first a scheme of voluntary recruiting, such as preceded conscription in England.

Mr. John Dillon, leader of the Nationalist Party in Ireland, declared in a meeting at Dublin that until the government of their country was handed over to Irishmen, neither the Catholic Church nor the Nationalist Party would give active support to the Irish Recruiting Committee.

LABOR PARTY ENDS POLITICAL TRUCE.—By a vote of nearly two to one, the British Labor Party at its conference in London, on June 26, passed a resolution ending the party truce that has been more or less effective since the opening of the war. This frees the party from any obligation to support the government or to refrain from contesting by-elections, and increases the probability of a general election in the autumn.

Mr. Arthur Henderson, the British Labor Leader, speaking at a conference at Northampton, England, on July 13, announced that five replies to the British Labor war aims statement had been received from Socialists in enemy countries. Bulgarian, Hungarian and Austrian Socialists issued a general endorsement of the statement. The German Majority Socialists declared their willingness for a conference on the basis of the proposals; the Minority Socialists expressed similar principles.

LORD CECIL ON ALLIED ECONOMIC LEAGUE.—An economic association of 24 nations comprising the Entente Allies is already in existence, said Lord Robert Cecil, British Under-Secretary of State of Foreign Affairs and Minister of Blockade, in a statement regarding the world's trade after the war, which was issued to-day.

Whether Germany eventually shall be admitted to this economic association, declared the British Minister, will be determined by the test established by President Wilson, when the President said on December 4 that if the German people should still, after the war was over, "continue to be obliged to live under ambitious and intriguing masters interested to disturb the peace of the world," it might be impossible to admit them to the partnership of the nations or to free economic intercourse.

Lord Robert described this statement by the President as a definition of the qualifications for membership in the association of nations, and added: "To these declarations we give our warmest assent."

Germany is the one obstacle to this economic association of nations, said Lord Robert—the Germany described by President Wilson—a Germany living under ambitious and intriguing masters. "Germany's economic policy toward all the groups of peoples from the Arctic Ocean to the Black Sea," he continued, "is absolutely contrary to our principles. Economic inde-

pendence and free choice are the last things which Germany will ever allow to the peoples within her reach.—*N. Y. Times*, 14/7.

GERMANY

RESIGNATION OF FOREIGN MINISTER VON KÜHLMANN

A remarkable crisis in political affairs in Germany followed the speech of Dr. Richard von Kühlmann, German Foreign Minister, before the Reichstag on June 24. It appears that, whether or not the minister's speech was approved and instigated by those in supreme control in Germany as a means of preparing the German people for a failure in France and at the same time opening the way to peace overtures, in the speech itself the minister spoke his own mind somewhat frankly.

He denied that Germany aimed for world domination, which he declared impossible for any nation. The war, he suggested, might be indefinitely prolonged, and would not be settled "through purely military operations alone and without recourse to diplomatic negotiations." He expressed the hope that the Entente nations would see that "victory for the Entente is a dream" and would approach Germany "with peace offers which will correspond with the situation and satisfy Germany's vital needs."

Kühlmann's Speech.—Significant passages in the minister's speech follow:

Speaking of the military situation, the Secretary said that victories had given the Germans the initiative in France. He continued:

"We can hope that the summer and autumn will bring to our arms a new and great success.

"The Austro-Hungarian Army also has in a dashing onslaught attacked the Italian positions and achieved noteworthy successes and pinned down large and important enemy forces on that front.

"When one makes a wide survey of events, one must ask whether the war, according to human calculations, will last beyond the autumn or the winter, or beyond next year. There is a common idea among the people that the length of the war is something absolutely new, as if the authoritative quarters had in our time never reckoned on a very long war. This idea is incorect."

Dr. von Kühlmann quoted von Moltke, who in 1890 in the Reichstag said that if war broke out, its duration and end could not be calculated.

"Despite the brilliant successes of our arms," continued the Secretary, "there has been nowhere clearly recognizable among our enemies readiness for peace. The German Government has repeatedly laid down its standpoint in declarations intended for the widest publicity. Our enemies have nothing to show that can in any degree compare with the German peace offer, with the resolution of this House, or with the reply to the Papal note.

"The declarations of our enemies, especially of English statesmen, allow as yet no peaceful ray of light to fall on the darkness of this war."

Rejects Aim to Rule Europe.—Referring to Mr. Balfour's speech, in which the British Foreign Secretary said that Germany had unchained the war to achieve world domination, Dr. von Kühlmann said:

"I do not believe that any responsible man in Germany, not even the Kaiser or the members of the Imperial Government, ever for a moment believed they could win the domination of Europe by starting this war. The idea of world domination in Europe is a Utopia, as proved by Napoleon. The nation which tried it would, as happened to France, bleed to death in

useless battle and would be most grievously injured and lowered in her development. One may here apply von Moltke's phrase, 'Woe to him who sets Europe afire.'

"At no moment of our later history was there less occasion for us to start or contribute to the starting of a conflagration than the moment in which it occurred.

"In a former debate I pointed out that the absolute integrity of the German Empire and its allies formed the necessary prerequisite condition for entering into a peace discussion or negotiations. That is our position to-day.

"From England the reproach is constantly made that we are not prepared on a hint from England to state our attitude publicly on the Belgian question. On this point the fundamental views of the Imperial Government differ from those ascribed to us by English statesmen. We regard Belgium as one question in the entire complex. We must, however, decline to make, as it were, a prior concession by giving a statement on the Belgian question which would bind us, without in the least binding the enemy.

"Mr. Balfour, moreover, by way of precaution, has added that we must in no way imagine that any agreement on the Belgian question exhausts the stock of English or Entente wishes. He prudently abstained from describing those points in which he intends to announce more far-reaching claims or desires.

"The supposition is not unjustified by previous experiences that while these words, on the one hand, were addressed to Paris, on the other hand covetous desires floated across the Mediterranean to the parts of Palestine and Mesopotamia at present occupied by the British troops.

"I hear already the justification which will be duly given for such desires, namely, that England could not possibly make such sacrifices of blood and treasure without reserving for herself most of the gains.

"*Hopes for Allied Peace Offers.*—As regards the probable course of events, the Imperial Chancellor and I have previously declared that in the present stage of development far-going advances on the road to peace can hardly any longer be expected from public statements which we shout to each other from the speaker's tribune. We, too, can adopt the words spoken by Mr. Asquith."

Dr. von Kühlmann quoted from Mr. Asquith's speech of May 16, in which it was said that the British Government would not turn a deaf ear to a peace proposal if it was not couched in ambiguous terms.

"We, likewise," he added, "can make the same declaration, knowing that it is also our policy. Once the moment arrives—when, I cannot prophesy—that the nations which are at present locked in battle will exchange peace views, one of the preliminary conditions must be a certain degree of mutual confidence in each other's honesty and chivalry.

"For so long as every overture is regarded by others as a peace offensive, as a trap, or as something false for the purpose of sowing disunion between allies, so long as every attempt at a rapproachement is at once violently denounced by the enemies of a rapproachement in the various countries, so long will it be impossible to see how any exchange of ideas leading to peace can be begun.

"Our positions on the battlefields, our enormous military resources, and the situation and determination at home permit us to use such language. We hope that our enemies will perceive that in view of our resources the idea of victory for the Entente is a dream, an illusion, and that they will in due course find a way to approach us with peace offers which will correspond with the situation and satisfy Germany's vital needs."

The minister then optimistically outlined German activities for the freedom of Russia under German control, admitted the difficulties of the Polish problem, and praised Count Burian for furthering a closer alliance between Germany and Austria.

ADMIRAL VON HINTZE SUCCEEDS KÜHLMANN.—Dr. von Kühlmann, who had served under Count Lichnowsky in London, was out of favor with pan-German, Junker, and Jingo elements, which at the time of his speech were predominant in Germany. His ascription to Russia of primary responsibility for the war and his comparative leniency toward England, together with his failure to fall in with the idea of a peace forced by the sword, gave a target for their attacks.

On July 9 the news reached the foreign press that Dr. von Kühlmann's resignation had been accepted, and that Admiral von Hintze, ex-Minister to Mexico and China and Minister to Norway, would succeed him. Hintze's record shows him an active and willing tool of the militaristic element, who will be even more subservient than his predecessor to the control of the general staff. While in Mexico, before and after the outbreak of war, he pursued a policy of active intrigue against the United States. He returned to Germany in the remarkable guise of an English gentleman, and in 1915, when appointed Minister to China, he eluded the Japanese by crossing the Pacific as super-cargo in a Norwegian tramp steamer.

On July 12 Chancellor von Hertling stated, "I will give my counter-signature to the appointment of Admiral von Hintze only on condition that he follows my line of policy and not his own. . . . . The proposed Secretary of State for Foreign Affairs is absolutely clear on this point."

CHANCELLOR VON HERTLING ON GERMANY'S TERMS.—In the debate following Foreign Minister von Kühlmann's speech of June 25, the Chancellor decried any further discussion of a league of nations, on the ground that such a league would have for its aim the isolation of Germany. He further laid the blame for the continuance of the war wholly to the Allies.

"Now, as before," he continued, "the ruler of the empire, the princes and the people stand closely and confidently together. They trust in our incomparable troops, our incomparable army leaders, and our united people, who are unshakably standing together, and we may hope that the Almighty, who hitherto has helped us and led us from victory to victory, will reward this faithful German people."

VON HERTLING'S SPEECH OF JULY 11.—In discussing the political situation before the Reichstag on July 11, the German Chancellor made it clear that while Germany was counting on victory by the sword, she was still willing to undertake negotiations at any time along the lines of the Peace of Brest-Litovsk and with the prospect of similar results.

Among the noteworthy points in the address were the following:

1. As long as the desire for our destruction exists, we must hold out.
2. Serious peace overtures will be carefully examined.
3. No future settlement can be permitted to upset the peace of Brest-Litovsk.
4. The Chancellor is still to direct foreign policy.
5. Belgium is to be held as a pawn in the peace conference.

The parts of the speech received by wireless on July 12 follow:

"I maintain the standpoint of the imperial reply to the peace note of Pope Benedict. The pacific spirit which inspired this reply has also inspired me. At the time, however, I added that this spirit must not give our enemies free conduct for an interminable continuation of the war.

"What have we lived to see, however? While for years there can have been no doubt whatever of our willingness to hold out our hand toward an honorable peace, we have heard until these last few days inciting speeches delivered by enemy statesmen. President Wilson wants war until we are destroyed, and what Mr. Balfour, the British Secretary of State for Foreign Affairs, has said must really drive the flush of anger to the cheeks of every German."

"*Says Allies Insult Germany.*—We feel for the honor of our fatherland, and we cannot allow ourselves to be constantly and openly insulted in this manner, and behind these insults is the desire for our destruction. As long as this desire for our destruction exists we must endure together with our faithful nation.

"I am also convinced—I know it—that in the widest circles of our nation the same serious feeling exists everywhere. As long as the desire for our destruction exists we must hold out, and we will hold out, with confidence in our troops, in our army administration and our magnificent nation, which bears so wonderfully these difficult times with their great privations and continuous sacrifices.

"In the direction of our policy nothing will be changed. If, in spite of these hostile statements by these statesmen, any serious efforts for a paving of the way to peace were to show themselves anywhere, then, quite certainly, we would not adopt a negative attitude from the very beginning, but we would examine these seriously-meant—I say expressly seriously—efforts immediately with scrupulous care."

"*For Limited Peace Discussion.*—Naturally, it is not sufficient when some agent or other approaches us and says to us: 'I can bring about peace negotiations, then and there.' But it is necessary for the appointed representatives of the enemy powers, duly authorized by their governments, to give us to understand that discussions are possible, discussions which for the time being naturally will be within a limited circle.

"But the statesmen who have spoken up to the present time have not said a word about such possibilities. When such possiblities manifest themselves, and when serious inclinations toward peace show themselves on the other side, then we will immediately go into them. That is to say, we will not reject them—and we will speak, to begin, within a small circle.

"I also can tell you that this peace must not disturb the settlement with Russia. It is our purpose to see this peace carried out in a loyal manner. That is the wish of the German Imperial Administration, and it is supported in this by the Chief of the Army Administration.

"However, the difficulty of the execution of the peace of Brest-Litovsk does not lie on our side, but in the fact that conditions in Russia are still exceedingly uncertain. We are inclined to believe in the loyalty of the present Russian Government, and especially in the loyalty of the representative of the Russian Government in Berlin.

"But we may not, and cannot, assume unconditionally that the present Russian Government has the power to carry through everywhere the loyal promises made to us. We do not at all wish to create difficulties for the present Russian Government, but as conditions now are, there are incessant developments and endless frictions in the frontier region. However, our principle is that we stand on the basis of the peace made at Brest-Litovsk, and we will carry out this peace loyally and will deal loyally with the present Government."

"*Blames Murder on Entente.*—They are still under the depressing influence of a terrible crime in Moscow. The murder of our Ambassador there was an act in violation of international law than which a worse could never cry to heaven.

"All indications point to the fact that the accursed deed was instigated by the Entente Allies in order to involve us in fresh war with the present Russian Government—a state of things which we are most anxious to avoid. We do not want fresh war with Russia. The present Russian

Government desires peace and needs peace, and we are giving it our support in this peaceful disposition and aim.

"On the other hand, it is true that political currents of very varied tendencies are circulating in the Russian Empire, movements having the most diverse aims, including the monarchist movement of the Constitutional Democrats and the movements of the Social Revolutionaries. We will not commit ourselves to any political counter-current, but are giving careful attention to the course Russia is steering."

"*Will Direct Hintze's Policy.*—In connection with this point, the Imperial Chancellor passed to a review of the political situation in the West. He then spoke of the reasons which led to the resignation of Dr. von Kühlmann, and concluded:

"The name of the man who is proposed as Dr. von Kühlmann's successor is known to you. Admiral von Hintze possesses a thorough knowledge of Russian affairs, which is a matter of great importance in the present situation. But it goes witout saying that I will give my counter-signature to the appointment of Admiral von Hintze only on condition that he follows my line of policy and not his own.

"However, as far as I am concerned, I already have a sure guarantee, for this is Admiral von Hintze's promise. I will direct the line of foreign policy, and the Secretary of State for Foreign Affairs has merely to carry out my policy. The proposed Secretary of State for Foreign Affairs is absolutely clear on this point.

"The course with which the great majority of the Reichstag declared itself to be in agreement in November of last year will still be followed."—*N. Y. Times*, 13/7.

BELGIUM HELD AS A PAWN.—The following passages relating to Belgium did not appear in the earlier versions of the Chancellor's address:

"It was never our intention to keep Belgium except as a pledge by which to secure Germany against future perils, and until the danger is removed we cannot surrender our pledge.

"In peace we must be guaranteed against Belgium being used for ground on which to deploy military forces, but also from the economic standpoint we must have guarantees against being isolated.

"It must be made to the interest of Belgium to secure close economic relations with Germany. Should Germany succeed in attaining such an intimate commercial connection, this would bring about a political agreement with Germany in which we should secure the best guarantees against future perils from England and France by way of Belgium."

The *North German Gazette* preceded its quotation from the Chancellor's speech by stating that, the first part of the speech regarding Belgium having already been published, the latter part of his observations was now issued to the press because the members of the Reichstag demanded it.

GERMAN PEACE PROGRAMS.—Illustrating the peace discussions at present rife in Germany, and put forward in the hope that Germany may be able to retire with her Eastern conquests intact, two sets of terms may be cited, the first a comparatively moderate statement for both foreign and home consumption, and the second a frank assertion of what Germany really would like.

The following dispatch from Copenhagen on July 9 was put forward by George Bernhardt, political editor of the *Vossiche Zeitung* of Berlin:

France and Italy to discuss with Germany and Austria their future frontier without the intervention of third parties.

All the German colonies to be returned.

Belgium to be restored completely as an independent State.

All merchants of the Central Powers who have been deprived of their property overseas to be restored to their former rights of possession.

Great Britain to evacuate unconditionally all parts of the Turkish Empire and Persia.

The situation before the war to be restored in Egypt.

The Dardanelles, on the basis of a treaty applying to the States bordering on the Black Sea, to be free for the passage of Russian ships.

"The time is now ripe to discuss peace conditions openly. Having regard to the ideal peace conditions laid down by President Wilson, unanimity on the matter undoubtedly could easily be reached if a method of discussing the peace terms could only be agreed upon," Bernhardt says. He adds that Germany and her allies would undoubtedly accept reasonable disarmament proposals.

President Wilson's demands for self-government by small nations, the writer says, would be favorably received, but the Central Powers would insist upon knowing the attitude of England regarding Ireland. Negotiations, the writer adds, should take place directly between the belligerents respecting frontier regulations.

The second proposals were set forth by Count von Roon of the pan-German party, and forwarded from Amsterdam on June 30, as follows:

1. No armistice by sea or land until the British forces have left France and Belgium and the Germans are in Paris.
2. Annexation of Belgian territory, which, though having administrative autonomy, is to be under military and economic control of Germany, while Flanders is to be independent and the coast up to and including Calais is to be annexed by Germany.
3. Annexation of the Briey-Longwy region.
4. France to surrender Belfort, Toul, Verdun, and all the territory to the east of those forts.
5. Return of all German colonies, including Kiao-Chau.
6. To bring about freedom of the seas, England is to surrender her fleet and coaling stations, yet to be decided upon, and Gibraltar is to be returned to Spain.
7. The whole British Navy is to be surrendered to Germany.
8. England is to return Egypt with the Suez Canal to Turkey, as well as all occupied Turkish territory.
9. Evacuation of Greece and the restoration of King Constantine.
10. The division of Serbia and Montenegro between Austria and Bulgaria.
11. Payment of an indemnity of $45,000,000,000 by America, England, and France, and a provision for necessary supplies of raw material.
12. Occupation of French and Belgian territory to continue till the agreement is carried out, the costs of occupation being defrayed by the enemy.

AUSTRIA

AUSTRIAN PREMIER RETAINED IN OFFICE.—The Austrian Cabinet headed by Dr. von Seidler resigned in a body on June 23, in the midst of the disastrous Italian offensive; and on the Monday following (June 25) it was announced that the Premier refused to reconsider his decision to withdraw. An order from the Emperor, however, forced him to remain in office until the time was more opportune for a new cabinet.

Addressing the Reichsrat, or Lower House, in Austria on its assembling July 16 after a four months' recess, the Premier spoke glowingly of the "old and well proved alliance with the German Empire." Turning to

internal affairs, he expressed the present strongly pro-German tendency of the government.

Dr. von Seidler recalled the refusal of the Czech Clubs to collaborate in revising the Constitution and said that if the government was not to expose itself to the reproach of political passivity it had to put into effect its program on national autonomy. Hence the decrees for the partition of Bohemia into districts.

It was far from his intention to deny that this was a German course, Dr. von Seidler continued, because if there was a political force in Austria it could only be such as guaranteed the protection of the just interests of the German race. The backbone of this multiform state was the German race, and it would always be so. The government would not be deflected from the course upon which it had entered. For those parties which stood aloof, Dr. von Seidler added, the door of understanding was always open. Over this door, however, was written, "Welcome to all who are loyal to the dynasty and the State." Declaring that the government had no animosity toward other races, Dr. von Seidler said that all the Germans and Austrians demanded was to be allowed to live and develop in peace. The government, he said, would also endeavor to do full justice to the national requirements of the races living in Galicia.—*N. Y. Times*, 18/7.

BURIAN READY TO TALK PEACE.—According to Vienna dispatches, Baron von Burian, the Austro-Hungarian Foreign Minister, in a note addressed to the Austrian and Hungarian Premiers on July 16, declared "there is hardly any difference between the general principles enunciated by the Entente and Teutonic statesmen."

In reference to President Wilson's four new points in his July 4 speech, Baron Burian said he was able to approve of them heartily and that to a great extent "nobody would refuse homage to his genius and nobody would refuse his co-operation."

The Foreign Minister said:

"In the midst of the terrible struggle, and in every phase of this war of successful defense, the Central Powers have had no other aim in view but to obtain the enemy's will to peace.

"If we sum up all that has been said on the enemy's side in regard to their war aims we recognize three groups of aspirations which are being set forth to justify the continuation of bloodshed so that the ideals of mankind may be realized.

"The freedom of all nations, which are to form a league of nations and which in future shall settle their difficulties by arbitration and not by arms, is to reign.

"The domination of one nation by another nation is to be excluded.

"Various territorial changes are to be carried out at the expense of the Central Powers.

"These annexationist aims, though variously shaped, are generally known.

"The intention, however, also exists, especially in regard to Austria-Hungary, to carry out her internal disintegration for the purpose of the formation of new states. Finally, our opponents demand our atonement because we dared to defend ourselves, and successfully against their attacks. Our ability to defend ourselves is termed militarism and must, therefore, be destroyed.

"Territorial aims are, in fact, the only things now separating the different belligerent groups.

"For the great interests of humanity and for justice, freedom, honor and peace of the world, as set forth in the laws of modern political conception, regarding which we need not accept any advice, we also are ready to fight.

"There is hardly any difference between the general principles enunciated by the statesmen of both belligerents. President Wilson's four new

points of July 4 shall not, apart from certain exaggerations, arouse our opposition.

"On the contrary we are able to approve them heartily to a great extent. Nobody would refuse homage to his genius and nobody would refuse his co-operation. This, however, is not the main point, but it is what can also be understood in the interests of mankind. Both groups should certainly honestly attempt to clear this up and settle it by mutual agreement, but not in the same manner as, for instance, our peace treaties in the East were judged.

"The fact is that all our opponents were invited to join in those negotiations and they could have contributed their share in bringing them to a different issue. But now, when it is too late, their criticism stands on weak grounds, for there is no legal right which would have entitled them to condemn the peace conditions which were acceptable to the contracting parties.

"From the confident utterances of our opponents it appears they have no fear of being defeated. If they, nevertheless, represent the peace treaties as a warning of our treatment of a defeated enemy we do not consider the reproach justified.

"None of the belligerent states need ever come into the position of Russia and Rumania, as we are ever ready to enter into peace negotiations with all our opponents.

"If our enemies continuously demand atonement for wrong done and restitution, then this is a claim which we could urge with more justification against them, because we have been attacked and the wrong done to us must be redressed.

"The enemy's obstinacy regarding his territorial demands regarding Alsace-Lorraine, Trieste, the Trentino and the German colonies appears to be insurmountable. There lies the limit of our readiness for peace. We are prepared to discuss everything except our own territory.

"The enemy not only wants to cut from Austria-Hungary what he would like for himself, but the inner structure, that of the monarchy itself, too, is to be attacked and the monarchy dissolved, if possible, into component parts.

"Now that it is recognized that ordinary war methods have not sufficed to defeat us, interest in our internal affairs suddenly has become supreme. The Entente, however, discovered its sympathy in our internal affairs so late that many an enemy statesman who now prates about the monarchy's national questions as a war aim had probably no idea of their existence at the beginning of the war.

"This fact can be recognized from that amateurish and superficial manner in which our opponents discuss and attempt to solve these complicated problems. This method, however, appears to them to be useful. They therefore organized it as they have organized the blockade, and in England they now have a propaganda minister.

"We wish to place this attack on record without useless indignation or whining. The choice of this new means of fighting us does not show too great a confidence in the success of the enemy's previous efforts. We are certain it will be unsuccessful.

"Our opponents start from a completely mechanical misjudgment of the character of the Austro-Hungarian monarchy and prefer in their satisfaction to overlook in the present difficult international problems the fact that these states with their various nationalities are no accidental structures, but a product of historical and ethnographical necessity, which carry in themselves the fundamental principle of life and race.

"They, therefore, possess, and this applies fully to Austria and Hungary, the necessary elasticty and adaptability to the changing events of the times, and the ability to reform themselves according to the necessity of their standard of development and to solve all internal crises without uncalled for foreign interference.

"Our enemies want to paralyze us by an offensive of irritation and to render us helpless. They want to crush our very powerful organism in order to make weak parts one after the other serviceable to their own purposes.

"According to their uninvited prescriptions, one-half of Austria-Hungary's population may perish in order to make the other half happy. For that purpose this senseless war must be continued.

"As has always been the case for centuries past, the states and races of the monarchy will settle their internal problems in agreement with their rulers. The monarchy resolutely declines foreign interference in any form, just as it does not meddle with the affairs of foreigners.

"We have never prescribed a program for our enemies as to how they shall deal with their domestic questions, and when we have had occasion frequently to recall that it is not all happiness and harmony with our enemies in their domestic affairs and that they have their own problems in Ireland, India, etc., we did so only by way of exhortation to reciprocity, giving the advice, 'Sweep first your own door!'

"Our enemy's inflammatory activity is not content with trying to stir up our races against one another, but it does not even scruple, by means of circulating monstrous and base calumnies, to sow distrust between the races of the monarchy and the hereditary dynasty."—*Philadelphia Public Ledger*, 17/7.

BURIAN'S SUBTERFUGES.—The Foreign Minister declares that "territorial aims, are, in fact, the only things now separating the different belligerent groups." He would have it appear that these territorial aims are imperialistic, prompted by the desire to seize territory as a spoil of war. No one knows better than he that the Allies desire territorial changes only that enslaved peoples may be set free, that they may become masters of their own destinies, and achieve their own national aspirations. Aside from the first great obstacle to peace, German militarism still unconquered, there are three others, three issues of the war which Baron Burian regards as already settled, but about which the Allies hold a different opinion. They are the treaty of Brest-Litovsk, which put 175,000,000 Russians in thralldom to the Central Powers; the treaty of Bucharest, which reduced Rumania to the condition of a vassal state, and the aspirations of the nationalities under bondage to Austria to achieve their freedom.

The Foreign Minister of the Dual Monarchy has the impudence to speak of that blot upon the face of civilization as "a product of historical and ethnographical necessity, which carry in themselves the fundamental principle of life and race." We have no idea what that means, but we know very well what President Wilson meant when he said:

"The peoples of Austria-Hungary, whose place among the nations we wish to see safeguarded and assured, should be accorded the freest opportunity of autonomous self-government."

Austria will accept no foreign advice in this matter, says the Baron. "The states and races of the monarchy will settle their internal problems in agreement with their ruler." It is one of the war aims of the Allies to deliver these nationalities from their present "ruler," who has always treated them as subject peoples. This is a vital war aim, because until it has been carried out, the peace of Europe and the peace of the world will rest upon no secure basis. The hope of deliverance grows in the hearts of these peoples with every day of the war's progress, and they can be denied only at the cost of endless uprisings and strikes in the future.—*N. Y. Times*, 18/7.

LANSING RENEWS PLEDGE TO SLAVS.—German and Austrian propaganda representing the United States as favoring the freedom of Poland without regard for what happens generally to the Czechoslovaks and Jugoslavs led Secretary Lansing to issue a statement to-day definitely announcing that

the position of the American Government is that all branches of the Slav race should be completely freed from German and Austrian rule.

The statement follows:

"Since the issuance by this government on May 29 of the statement regarding the nationalistic aspirations for freedom of the Czechoslovaks and Jugoslavs, German and Austrian officials and sympathizers have sought to misinterpret and distort its manifest interpretation. In order that there may be no misunderstanding concerning the meaning of the statement, the Secretary of State has to-day further announced the position of the United States Government to be that all branches of the Slav race should be completely freed from German and Austrian rule."

RUSSIA

KERENSKY VISITS ENTENTE POWERS.—Alexander Kerensky, visiting England and France on his way to America, spoke on June 27 before the British Labor Conference then in session in London.

A special correspondent of the *Chronicle*, giving Kerensky's views, says that in Kerensky's opinion the Allied policy must take a clear line against the Bolsheviki. They must not be regarded as identical either with the Russian nation or with democracy; on the contrary, they are the antihesis of both. Anti-Bolshevist feeling in Russia is intense and universal, except among certain elements in the army and in the urban working class.

They have now little or no peasant support, but the people cannot act against their rulers, as the latter control the artillery, the munitions, the railways, and so much of the machinery of government as still exists. Moreover, they are disunited, with no rallying center, and the Bolsheviki do their best to prevent anybody from creating one, by wholesale suppression of liberty of the press and of public meeting.

Kerensky is strongly in favor of Allied military intervention, but it should be intervention of the Allies and not of any one Allied power. That would not prevent some one Allied power, as Japan, from contributing the bulk of effectives. Its character should be military to fight the Germans, not to interfere in Russian politics as such.

He is convinced the Russian military forces will eventually take a leading part in driving the Germans out of their country. At present large elements in the Russian reactionary parties are turning to Germany as their only salvation from the Bolsheviki. This movement will tend to spread to the other parties, unless the Allies supply an effective alternative hope.

In his subsequent visit to Paris Kerensky associated chiefly with Socialist leaders, and expressed views less favorable to military intervention than those suggested by the *Chronicle* reporter. It was said that Kerensky preferred the term "assistance" to "intervention," and maintained that Russia was not ultimately out of the war. He presented the appearance of a man "long hounded and in fear of his life."

RUSSIA FACES CALAMITY.—"The strongest reason I have for sending assistance to Russia," said Lord Robert Cecil, in an interview with a representative of the *N. Y. Times* on July 19, "is that I am convinced that only by our aid can Russia live. We don't know what is going on in Moscow, but we may be sure that Russia is face to face with the most terrible disaster, both economic and hygienic, which any people has ever experienced. Asiatic cholera and typhus in all its forms are raging and the mortality must be fearfully high."

"To me it is a most terrible thing that in a country far more self-supporting, not only in its southern districts, but also in Siberia, than other

countries there are vast populations within a few hundred miles of the most fertile regions in imminent risk of starvation. It is all the result of disorganization. Why, I was told to-day that in a large, fertile region south of Omsk and Tomsk the population had been unable to get any clothing since the beginning of the war.

"The Czechoslovak force, which numbers something like 60,000, seems to be the only organized force in Siberia. They stand not for any particular form of government, but are the only form of government, even of a most elementary character, in all that vast territory, and if they are wiped out there would seem to be nothing left that could save Russia.

"Quite good judges have expressed the view—don't give the figures as coming from myself— that unless some help comes speedily the death roll in Russia this winter may reach 20,000,000."

GERMAN AMBASSADOR ASSASSINATED.—On July 6 at 3 p. m., General Count von Mirbach, the German ambassador sent to Moscow after the Peace of Brest-Litovsk, was assassinated in his offices in the Russian capital. At the time of the murder revolutionary rioting was going on in the streets of Moscow, and the Soviet government reported that the ambassador's death was engineered by leaders of the Social Revolutionary (anti-Bolsheviki) party.

The Allied powers viewed this manifestation of Russian political activity without deep regret. Germany, however, not seeing a way to turn the episode to advantage, declared that the Soviet government was not to be held responsible.

ALLIES OCCUPY MURMAN COAST.—Dispatches of July 15 confirmed earlier reports that British and American naval forces in the Arctic had landed troops and occupied the Murman coast and parts of the Murman railroad. This was done with the approval of the local population, whose interests are with the Allies, and with the object of preventing supplies in Arctic ports from falling into hostile hands, guarding the only western communications between Russia and the Allies, and shutting Germany off from a possible submarine base in the Arctic. Thus at the same time a route is kept open for further aid to Russia.

American and British troops have occupied the whole of the Murman coast, in Northern Russia, says a despatch from Moscow to the Central News Agency by way of Amsterdam.

After capturing Kem, a railroad station on the White Sea coast, the dispatch adds, the American and British forces advanced toward Toroki, the Russian Bolshevist authorities having withdrawn to Nirok.

The commanders of the Entente allied forces have issued an appeal to the population on the Murman coast requesting help against Germany and Finland. It is declared that the Murman coast is Russian territory under the protection of the Entente Powers.

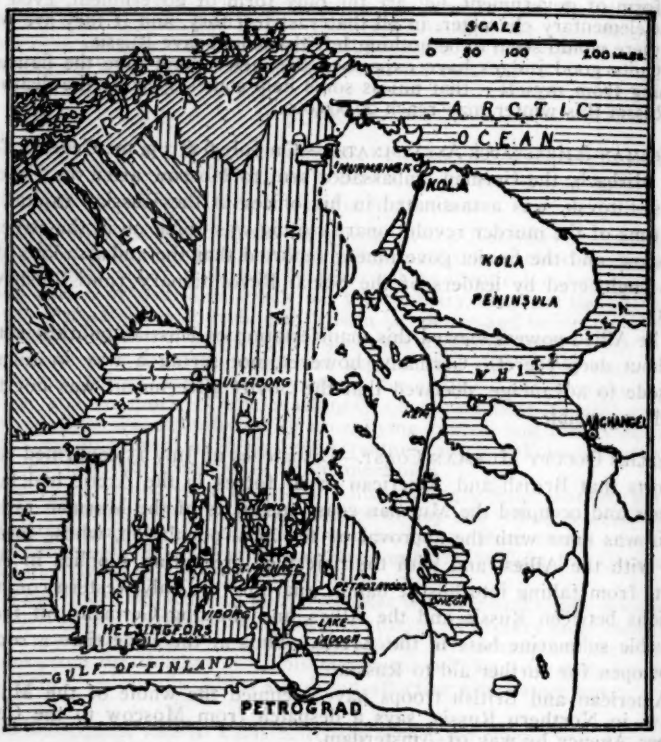
M. Tchitcherin, the Russian Foreign Minister, has addressed a note to Great Britain demanding that the British detachments now on the Murman coast be re-embarked without delay.—*N. Y. Times*, 7/7.

FINLAND NEUTRAL.—A bill providing for the establishment of a monarchy in Finland has passed its second reading in the Finnish Parliament by the narrow margin of four votes, says a Helsingfors dispatch by way of Copenhagen to the Exchange Telegraph Company.

Republicans have started an energetic agitation against the bill, and it is not improbable, the dispatch adds, that the Finnish Government will have to resign, as the majority in favor of the bill is insufficient.

It is stated that Finland intends to remain neutral if a serious conflict occurs in the Murman country, where Entente allied forces have assumed control.

The *Nordeutsche Allgemeine Zeitung* of Berlin declares that Germany has sufficient forces in Finland to deal with the Entente troops and the Red Guards.—*N. Y. Times*, 17/7.



THE MURMAN COAST, EAST OF FINLAND, THREATENED BY A GERMAN-FINNISH FORCE. HOSTILE OPERATIONS IN THIS FAR NORTHERN REGION MENACE KOLA AND ARCHANGEL, WHERE HUGE MILITARY STORES BELONGING TO THE ALLIES ARE ACCUMULATED.

THE MURMAN COAST AND RAILWAY.—Having just arrived from the Murman district, in the north of Russia, V. Goriachkovsky, chief engineer of the Murman railroad system, was able yesterday to confirm the reports that the entire Murman population is eagerly appealing for Allied intervention.

"I am not in the least surprised that the population of Murman has proclaimed openly for the Allies," he declared. "The people there are hostile to Bolshevism, and, being remotely located from the Soviet machine in Moscow, have not yet been terrorized by Red Guards. Spending nearly two years among them, I could not help being impressed with their outspoken loyalty to the cause of the Allies.

"This devotion has been developed, not only by reason of their patriotic faith in the cause of the Allies, but also by reason of the fact that since the revolution and even before the Murman population has received almost all of its food and supplies from America and the other Allies. So far as the Soviet Government in Moscow is concerned, the Murman district is left to starve, and would starve if it were not for the food that is coming through the ice-free port of Mourmansk from the Allies.

"This is true to such an extent that the people in the Murman region feel much closer to New York than they do to Moscow, and are accustomed to look to the Allies for friendship and help rather than to the government which now assumes to rule in Russia.

The Murman railroad, Mr. Goriachkovsky said, would furnish the tactical avenue of approach from this direction and would be of inestimable value to the Allies in maintaining a steady line of communications from the Arctic to the interior of Russia. The railroad runs from the ice-free port of Murmansk to Perosavodsk, a distance of 1000 kilometers and from there connects by water with further interior points. Its distance from the Finnish border on the west varies from 200 to 60 miles. Although one-third of the route, including the harbor of Urmansk, lies completely within the Polar region, the warm currents that pass through that particular region of the coast keep this Arctic port free from ice all year around and make it accessible to foreign shipping.

"Russia had to find such a port," said Mr. Goriachkovsky, "because the outbreak of the war found it cut off from the sea in the south and the west, and Archangel was accessible only five months in the year, being closed with ice the other seven months. Now that she has developed an ice-free harbor and an avenue of communication from the north, you can well understand that Germany is endeavoring to launch through Finland all the military and political intrigue that she can, to deprive the Allies of access to Russia through the Murman road.

"The reports that thousands of German prisoners used in the construction of the railroad during the years 1915 and 1916 have died from disease are an example of German propaganda in that direction. Thousands of German prisoners were interned in the Murman district, and it is true that many of the workers on the railroad did develop scurvy, owing to the primitive conditions under which the road had to be constructed. But the death rate has been miraculously low. Not more than 1 per cent of those taken ill have died."

Describing the general character of the country, Mr. Goriachkovsky said:

"Murmansk, the terminal station of the Murman Railway, is situated at the short of the Kola Gulf. It is a good and deep harbor, well protected against winds by the high, rocky shores of the gulf. The depth near the piers is 32 feet, and in the bay 70 feet at low tide. The tide attains a height of 11 feet at times. In the summer months there is perpetual daylight, and in the winter months the port is lit with electricity, supplied by a central power station.

"The region which is penetrated by the Murman line is mostly covered with forests, chiefly pine trees. Near the sea there has already been considerable cutting, most of this timber being exported to England. There are some large sawmills at Soroka, Keret, and Kovda. As soon as the rails of the Murman line were joined, although the line itself was not yet complete, we started to carry from Murmansk to the interior war supplies, which were furnished by America, England, and France. During the winter of 1916-17 the entire amount of ammunition landed at Murmansk, about 100,000 tons, was transported by the new railway from Murmansk to the front. In comparison with this achievement, it is worth noticing that the transportation of the munitions for the Russian Army from Vladivostok by the Siberian Railroad was not half so successful. A good

deal of war materials consigned from that port did not reach the front at all.

"To bring goods from America, it is, of course, safer that they should come by way of Vladivostok than by way of Murmansk. On the other hand, it must be remembered that the distance from Vladivostok to the front is eight times greater than the distance from Murmansk. In the spring of 1917 the Murman Railroad, not yet completed, carried three times more cars to the front daily than did the Siberian Railroad.

"'During the summer of 1917, after all steamers were directed straight for Archangel harbor and the Murman Railway was temporarily relieved of the traffic, we got an opportunity to finish the construction of the road. The erection of dams on the swamps and the ballasting of the roadbed were made possible on large scale owing to the prompt and regular delivery at Murmansk of considerable construction machinery from America. The excavation of earthworks amounted to 10,000,000 cubic meters, of which more than 1,000,000 cubic meters consisted of stone that had to be blown up with dynamite. The total length of the bridges along the line is 16,000 meters. At the present time provided as it is with stations, water supplies, dwellings, and materials, the Murman Railway, once furnished with the necessary rolling stock, can easily carry 3500 tons of supplies per day, while the port of Murmansk, with its piers, cranes, and tracks, is equipped to receive the same amount of tonnage daily."

Military Protection Needed.—According to Mr. Goriachkovsky, immediate steps should be taken to supply the Murman road with ample military protection.

"This would not be a difficult task," he said. "It would merely require the placing of an adequate force at both extremities of the road, Murmansk and Petrosavodsk, or at some point in the center of the line, from which troops could be readily dispatched to any portion of the road that might be in danger of attack. At the present time, of course, there are some Allied vessels off Murmansk, but the other end of the road, Petrosavodsk, is entirely exposed to German penetration.

"The loss of the Murmansk Road would mean the loss of the only available approach directly into Russia. Every precaution should be taken to prevent such a catastrophe. For the protection of the road not a very large force would be necessary, because the inhabitants themselves, in their loyalty to the Allies, and in their knowledge that the road is the only means by which they can get their food, could be relied upon to give all the assistance in their power to guard the line against damage.—*N. Y. Times*, 14/7.

ALLIED INTERVENTION HANGS FIRE

RUSSIAN ECONOMIC MISSION.—During June and July the plan of the United States Government for aid to Russia tended to assume the form of an economic mission. This plan was proposed by the President to his Cabinet, on June 25, and was afterward discussed with the Allied nations. It was reported on July 16 that Mr. Daniel Willard, President of the Baltimore and Ohio Railroad, had been offered a place on this body of business men, industrial leaders and financiers, and that Mr. Frank A. Vanderlip, President of the National City Bank of New York, would also be a member.

CZECHOSLAV ARMY OCCUPIES VLADIVOSTOK.—Diplomatic advices received July 15 from Vladivostok said that the city was quiet, with Czechoslovak forces in complete control after enforcing general disarmament and occupying the principal government buildings.

American, British, and Japanese naval guards who have been on duty for months guarding war stores were reinforced from ships in the harbor when it became apparent that the Czechoslovaks were preparing to take charge of the city by force. They apparently had no part in the fighting, however.

The Czechoslovaks issued an ultimatum to the Soviet demanding disarmament and surrender of the city. Russian sailors at the naval barracks laid down their arms, but some detachments of the Red Guard resisted and lost a number of men. Some of the Czechoslovaks also were killed.

The dispatch added that four Russian destroyers controlled by the Bolshevist Government had been prevented from leaving the harbor by the Allied naval commanders.

At the same time the total overthrow of the Bolsheviki at Irkutsk was reported, and according to later dispatches the Czechoslovaks were making progress toward control of the Siberian Railway between this important point and Vladivostok. The town of Klutschevsk, 550 miles east of Irkutsk, fell into their hands on July 15. In the region west of Lake Baikal, the occupation of the important city of Kazan, 430 miles east of Moscow, marked a decisive step toward complete control of Siberia east of the Ural Mountains.

The arrival of Col. Hurban, a representative of the Czechoslovaks, at Tokio en route for the United States, was announced on July 4. Col. Hurban estimated the Czechoslovaks in Siberia to number about 80,000, of whom 15,000 were at Vladivostok. Preliminary to military and financial support, Japanese and American Red Cross Aid was dispatched to the Czechoslovak forces.

RIVAL GOVERNMENTS SET UP IN SIBERIA.—General Horvath has proclaimed a provisional Siberian Government at Grodekovo between the Manchurian border and Vladivostok, whereof he is the head as Premier and Foreign Minister, with others holding various portfolios. The proclamation announces the abolition of all Bolshevik decrees, the equality of all citizens, universal suffrage, the maintenance of all foreign engagements, etc.

The Allied ministers this morning decided to advise General Horvath to withdraw the proclamation and retire, on the ground of the inexpediency of forming any government at the present moment, when the situation is not clear. Horvath's government, as well as the other so-called provisional government in Vladivostok, professes a connection with the new provisional government at Omsk. That in itself, however, has not been firmly established yet, nor is any estimate of its strength possible until communications are opened between western and eastern Siberia.—*Philadelphia Public Ledger*, 17/7.

The Daily Mail's Harbin correspondent, describing General Horvath's Government, says it is a thoroughly representative Siberian Government. Included in it are the most prominent figures in the commercial, industrial, and agricultural life of the Siberian continent. It promises to be acceptable to nine-tenths of the Siberian population, the correspondent says, and he adds:

"General Horvath who is temporarily Premier, made his reputation in the Russo-Japanese war as organizer of troop transport across the Siberian Railway. He was right-hand man of Alexieff when the latter was Viceroy of the Far East. At present he is head of the Chinese Eastern Railway and generally recognized as the most representative Russian in Manchuria.

"Provisionally a member of the new government, Admiral Koltchak, who formerly commanded the Black Sea fleet, is now Commandant of the Harbin Russian forces. The new government has this in its favor: That it represents all political elements, Cadets, Liberals, and Socialists. Only such a coalition government could hope to succeed.

"A purely Socialistic Government is now at Nikolsk, negotiating with the Czechoslovaks before proclaiming itself. Some opposition is expected, but it is not of a character to carry much weight."

In a later message, dated July 9, the correspondent says:

"The absolute necessity that exists for Allied intervention in Siberia is clearly demonstrated by the opera bouffe of two rival governments, each claiming to represent the unfortunate Siberians. The newer of these two governments is Horvath's which is now at Nikolsk. It includes men of action and solid representatives of Siberian interests, and, therefore, in my opinion, is much more likely to make good in Siberia and to receive Allied approval than the older government, which has transferred its Parliament from a railway car in Harbin to Vladivostok.—*New York Times*, 16/7.

ALLIED INTERVENTION DISCUSSED.—The Japanese Government has reached a decision, which was the outcome of proposals from the United States, says a dispatch from Tokio to the *Times* under date of July 13, for joint American-Japanese intervention in Siberia. The American proposals, the dispatch adds, were different from those made by Great Britain and France.

Tokio dispatches to the Associated Press announce that the Japanese newspapers on Tuesday published the terms of an American proposal to send American troops to Siberia. The newspapers declared that the Japanese Government had decided to accept the suggestion made by the American Government that Japan also send troops.

"According to information in Tokio," says the dispatch, "the plans of the United States in Russia are twofold: First, military assistance to the Czechoslovaks, and second, giving general economic help to Russia.

"The United States is described as being of the feeling that the Czechoslovaks should not be abandoned while they are striving to reach their aim. It is said there is no desire on the part of the American Government to intervene in Russian affairs, but that it favors the despatch of sufficient forces to leave the Czechoslovaks free to insure the safe arrival of their comrades from the interior.

"The impression here to-night is that Japan, in a spirit of co-operation with her allies, will follow the suggestion, and, like the Americans, send troops. Great Britain and France, it is said, also will send small contingents, so as to make the movement interallied.

"Many Japanese leaders, however, favor more extensive military movements in Siberia than have been suggested by the United States. Their ideas are based on combatting the eastward extension of German influence and the safeguarding of Japan's interests. It is suggested as not being unlikely that the Japanese Government, responding to this opinion, which is growing, later may open negotiations with the United States and the Entente Governments concerning the wisdom of intervention in Russia, which, while being chiefly directed by Japan, would be supported by all the Allies.

"The indications are that the statesmen who guide the policies of the empire desire to work in close harmony with the Allies, including the United States."—*N. Y. Times*, 19/7.

EX-CZAR'S DEATH OFFICIALLY CONFIRMED.—*Wife and Son Sent to a Place of Security—Important Documents to Be Made Public.*—Former Emperor Nicholas, of Russia, has been shot, a Russian wireless statement to-day announces. The former Empress and the young Alexis Romanoff,

the former heir apparent, have been sent to a place of security. The Central Executive body of the Bolshevik Government announces that it has at its disposal important material documents concerning the former Emperor's affairs, including his own diaries.

The message announces that a counter-revolutionary conspiracy was discovered, with the object of wresting the ex-Emperor from the authority of the Soviet council. In view of this fact the president of the Ural regional council decided to execute the former ruler and the decision was carried out on July 16.—*Baltimore American*, 21/7.

BALKAN STATES

PRO-ALLIES IN RUMANIA ATTACKED.—Deputy Stroict introduced a resolution in Parliament to-day demanding the impeachment of the members of the former Rumanian Cabinet headed by J. J. C. Bratiano, for their connection with the entry of Rumania into the war.

The men mentioned by the Deputy were ex-Premier Bratiano, E. Costinesco, ex-Minister of Finance; A Constantinesco, ex-Minister of Agriculture; V. G. Mortzoun, ex-Minister of Interior; Dr. C. Angelesco, ex-Minister of Public Works, and Take Jonescue, ex-Minister without portfolio.

The Bratiano Cabinet was formed in January, 1914, and except for a reconstruction in the latter part of 1916, continued in office until last February.

BULGARIA DISSATISFIED.—Definite indication that an influential section of Bulgarian opinion is so dissatisfied with Bulgaria's recent treatment at the hands of the Central Powers, particularly in their refusal to give her all of the Dobrudja outright, as to be willing to talk of the desirability of getting out of the alliance, is contained in extracts from the Bulgarian press at the time of the visit of the Austrian Emperor and Empress to Sofia late in May, These documents come from the Serbian Press Bureau in Geneva, the accuracy of whose reports has never been questioned.

From the contents of Bulgarian newspapers of that day it appears that the *Mir*, the paper of ex-Premier Gueshoff, head of the National Party, made a very thinly veiled suggestion that Bulgaria was getting the worst of it and might profitably look elsewhere.

The visit of Kaiser Karl to Czar Ferdinand was made the occasion of much demonstration of friendliness and loyalty, but reports from the Austrian-Swiss frontier after the return of the imperial pair to Vienna declared that their train was stoned while passing through Bulgaria.

It is evident, too, that the food situation was an important factor in the discontent, which was shared by most of the opposition parties, though none of the others went to such lengths as the Nationalists. Some days later Radoslavoff resigned, but Gueshoff was not recalled to power; instead a government was formed by Alexander Malinoff, head of the Democratic Party, whose platform seems to have dealt chiefly with the determination to try to get all the Dobrudja and other concessions from the Central Powers.

Gueshoff has always been very friendly toward Russia. He was Premier during the early part of the Balkan wars but resigned early in June, 1913, just before war broke out between Bulgaria and the other Balkan States, after vainly trying to induce his nation to make concessions to Serbia and Greece.

In all these manifestations of dissatisfaction with Bulgaria's present position, however, there has been no evidence of willingness to make any concessions to the Allies. All the parties opposed to Radoslavoff were busy reproaching his government for its failure to secure the widest annexations, and the idea of a territorial compromise does not seem to have been mentioned so far.—*N. Y. Times*, 10/7.

DEATH OF THE SULTAN OF TURKEY.—Mohammed V, Sultan of Turkey, died on July 3, at the age of 74. He was put on the throne by the Young Turks in 1909.

AMERICAN PROTEST TO TURKEY.—An attack by Turkish troops on the American Consulate at Tabriz, Persia, and the looting of an American missionary hospital in that city, reported on June 19, led to a series of inquiries from the United States Government. The reply finally elicited from Turkey was unsatisfactory, dwelling chiefly on the difficulty of placing responsibility for the offense.

CHINA

ALLIED LOAN NEGOTIATED.—The American Government agreed to a loan to China by American bankers provided China cancels all outstanding loans, and that all loans be shared by the bankers of the United States, Great Britain, France, and Japan. Details of the loan have not been completed, but $50,000,000 is the approximate figure under consideration to be advanced from this country.

It is understood that the State Department insisted upon the quadruple financial alliance, so that no one country should gain a predominant financial influence in China. This will necessitate the cancellation of the $10,000,000 loan advanced recently by Japan in agreement with Entente bankers. Because of war conditions, it was said that bankers of the United States and Japan for the present will advance the loans for Great Britain and France.

New York and Chicago bankers, with State Department officials, are now working out details of the loan to be made by American financial interests. The American bankers are satisfied with the regulations laid down by the government.—*N. Y. Times*, 19/7.

REVIEW OF BOOKS
ON
SUBJECTS OF PROFESSIONAL INTEREST

"The Whys and Wherefores of Navigation." By Gershom Bradford, 2d. $2.00 net. (New York: D. Van Nostrand Company.)

The author has written this book with the idea of furnishing supplementary reading to a student of navigation, particularly when Bowditch is used as a text-book. At the present time with so many students taking intensive courses in navigation, perhaps a majority learn the subject by rule and rote without grasping the reasons or with only a vague understanding of the important elements of time, declination, right ascension, latitude, and longitude. The author has elucidated these points and has expressed himself clearly in simple language.

In addition to the general introductory remarks chapters are devoted to Nautical Astronomy; Declination and Right Ascension; Time; Corrections to Observed Altitudes; Latitude; Azimuths, Longitude; Lines of Position; the Moon; and Charts. As far as possible, each subdivision is independent of the others and the author does not hesitate to repeat himself, providing that by so doing he can make his explanations more explicit.

Generally speaking, the text does not conflict with the methods of navigating as practiced in the U. S. Navy. The book is recommended to all students of navigation and also to those who find themselves "rusty" in the subject. A. W. B.

"The Men on Deck, Masters, Mates and Crew—Their Duties and Responsibilities." A manual for the American merchant service. By Felix Riesenberg, C. E., Master Mariner (sail and steam). $3.00 net. (New York: D. Van Nostrand Company.)

With the enormous increase of our merchant service, it has been necessary to train thousands of officers and men to man the ships. Naturally the majority of these officers will lack the practical experience that is gained by an apprenticeship, followed by several years service in the various grades before becoming a master mariner. "The Men on Deck" should offer the same service to the merchant service as the Naval Regulations and Instructions do to the navy. Chapters are devoted to the Duties and Responsibility of the Master; the Chief Mates; Mates; Junior Officers; and Crew. Copies of the U. S. Laws by which the merchant service is regulated are interspersed throughout the volume.

The object of the book is to show WHAT are the duties of the American seaman, rather than to explain HOW to execute those duties. It offers an efficient ideal standard which should make the American merchant service known throughout the "Seven seas" as the most efficient in the world, as it was in early clipper-ship days. A. W. B.

"Bombs and Hand Grenades." By Captain Bertram Smith, Bombing Instructor with the Canadian Expeditionary Force. $2.00 net. (New York: E. P. Dutton and Co.)

The subject of bombs and hand grenades is treated in a fairly elementary manner and in a technical manner at the same time. The book can easily be understood by beginners and is well illustrated by excellent sketches which are self-explanatory. The construction and use of British, French, and German bombs and hand grenades are explained to perfection. The book shows that it is the work of a master on the subject. Not only does the book show the construction and use of these bombs and grenades, but it shows how to render them useless. Modern trench warfare has introduced many varieties of bombs and grenades, but only those in general use by both sides are treated in detail. The following are the subdivisions of the book:

Explosions in General; Fuses and Lighters; Blocking Trenches against Grenade Attack; Chemical and Smoke Bombs; Various Types of British Hand and Rifle Grenades, 15 Types in All; Five Types of French Grenades; Description and Instruction for the Use of German Grenades; Ten Types of German Grenades.

This excellent book should be in the hands of every one instructing our men in bombing and grenade work, and would make very interesting reading for those who take interest in modern trench warfare. H. B.

"International Law Codified." By Pasquale Fiore, Professor of International Law at the University of Naples, Senator of Italy. Translated by Edwin M. Borchard, Professor of Law at Yale. 750 pages. (New York: Baker, Voorhis and Co., 1918.)

The purpose of this standard work is, as its author points out, not merely to assemble the rules of international law as recognized at present, but to formulate a more complete code, as a guide for the future, toward which the society of nations may hope to progress. The book is thus the product of the author's study and reflection, based on the accomplishments of the past and guided by the best thought of the present. After passing through five Italian editions since its first publication in 1890, the book now first appears in English, in a very satisfactory translation, under the auspices of the Carnegie Endowment.

After a long and honorable career as scholar and publicist, M. Fiore died in 1914. He was a delegate to the First Hague Conference in 1899, the assembling of which was in some measure a fulfilment of the methods he had advocated, and at which, as well as at the later conference in 1908, his teachings exerted a marked influence. Revised and expanded, his book retains a great value for to-day, and the English version will make it more generally available for study.

It is well remarked by the author that while every great war casts discredit upon and even threatens the downfall of the law of nations, that law has emerged firmer and tougher than before. This indeed must be so, for as the world grows smaller and nations come into closer and more

constant contact commercially, socially and politically, the codes controlling international relations must increase in scope, complexity and binding force. Otherwise, causes of friction would multiply and the world be plunged into constant war. In short, the author is right in his reiterated declaration of faith, "The primitive legal society was the family; the legal confederation of civilized peoples will be the last and highest manifestation of law." Note that he says "the last," for he has no illusions of a present-day Utopia.

M. Fiore is suspicious of any confederation of states in which the Great Powers would exert a paramount interest, similar to that of Prussia and Austria in the old German Conferation. He also recognizes the objections to any scheme to maintain the *status quo*, without machinery to adjust the changes inevitable in the growth and decadence of nations. To meet the situation, he proposes: (1) A Congress to assemble periodically with power to legislate in international matters; and (2) a Conference to convene on the request of any state and ensure the execution of the rulings of the Congress by referring the case to arbitration or to the Congress in executive session. Such decisions, he recognizes, would require behind them some form of organized force, as well as the weight of an enlightened public opinion.

While M. Fiore is democratic in his respect for public opinion, and would have the delegates to his conference selected at least in part by popular vote, he would have the suffrage in such voting limited to the "well-informed classes"—a phrase which sounds by no means democratic. Other opinions of the author may be merely noted. He argues that a person has rights beyond his rights as a citizen, and that a state should not have the power to prevent expatriation or to exclude immigrants. He condemns the principle, accepted in Italy, that a state may refuse to extradite its citizens. He denies the force of the Monroe Doctrine to prevent European nations from prosecuting the claims of their citizens against Latin American countries, if necessary by collective intervention. Finally, he holds that an offense against the law of nations is an offense not only against the injured state, but against the society of states, which should take collective action.

A. F. W.

"Offensive Fighting." By Major Donald M. McRae, M. C. (I. R. C.). 196 pages. $2.00. (Philadelphia and London: J. B. Lippincott and Co.)

In this work there has been presented in a very interesting manner a fund of information gathered by experience in the present war, covering the details of the operations that fall to the daily lot of the officers and enlisted personnel engaged in front-line work.

As has been often repeated, this war has not only shattered many ideas that have been held by us all, but it has produced new and unanticipated methods of combat which have in turn taxed the resources of individuals for nearly four years, to develop details of execution of those methods in order that the desired result may be attained with the greatest economy possible.

"Offensive Fighting" describes those details, and gives many reasons for the numerous statements and instructions, with incidents to illustrate here and there, so that the training for trench work may be taken up with an intelligent idea of the objects ahead and how best to realize those objects, so that the methods employed can be rehearsed by individuals and organizations.

The author shows that in the British service, in the early days of war, there existed a personal element that produced a really deplorable state of affairs, but which was soon fortunately seen to be both foolish and unnecessary. This was a lack of team-work between the artillery and infantry, due to several causes, not the least of which seems to have been a lack of knowledge, on the part of each, of the powers and limitations of the other. Mutual acquaintance was the remedy.

It is to be feared that, at times, this state of mind exists in our own services. A stupendous conception of team-work is required. The teams are the Teutonic allies on one side and the several nations aligned against them on the other. So, at least for the time, not only personal, but national and even international differences must be laid aside, as we are all employing ourselves for the same end and we are *each dependent upon the other* for success.

It is to be earnestly desired that the new methods of combat as developed in this war, together with the details of execution as found to be effective, be learned by every officer and enlisted man in the service, in order that economy of personnel, matériel and time may be effected in the prosecution of the operations required for the winning of the struggle, and "Offensive Fighting" seems to present those details in a way easily understood and, at the same time, complete to the limit of present experience on the subject.

A. D. R.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fifth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1918, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1919

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All essays published in the PROCEEDINGS during 1918, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1919, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1918. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1918 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. Essays are limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

6. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Lieut. Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ESSAYS

SUGGESTED BY REQUEST OF THE BOARD OF CONTROL

"Duties and Responsibilities of Subordinates with Special Reference to the Relations between Commanders-in-Chief and Chief of Naval Operations; Commanders-in-Chief and Force Commanders; Force Commanders and Division Commanders."

"Initiative of the Subordinate—Its True Meaning."

"Military Efficiency Dependent upon National Discipline."

"Governmental Organization for War."

"Naval Gunnery, Now and of the Future."

"Naval Policies."

"The Place of the Naval Officer in International Affairs."

"Moral Preparedness."

"Tact in Relation to Discipline."

"The Principles of Naval Administration in Support of War-Time Operations."

"What Steps in Organization and Training Should be Taken to Maintain and Increase the Efficiency of the Navy at the Close of the Present War."

"Responsibilities and Duties of Naval and Military Officers of the United States in Educating and Informing the Public on Professional Matters."

"A Commission in The Navy: Its Meaning and the Obligations Which It Involves."

"The Relations of an Officer to his Subordinate, Both Commissioned and Enlisted."

"The True Meaning of the Expression 'An Officer and a Gentleman.'"

"The Effect of the Present War upon Views Previously Held of Naval Strategy, Tactics and Logistics."

"Seen in the Light of Recent Events, What Should Be the United States Navy of the Future as Regards Types and Numbers of Ships."

"Probable Future Development of Surface-craft, Air-craft and Submarines and the Relation of these Types to Each Other and to Naval Warfare in General."

"The Grand Strategy of the Great War, with Especial Reference to Coördination, and Lack of Coördination, Between Naval and Military Forces."

"The Problem of Overseas Operations in the Light of Recent Developments."

"The Influence of Sea Power upon History as Illustrated by the Great War."

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906 By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

1916

The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

1917

Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

NAVAL STRATEGY. Second Honorable Mention, 1918. By Rear Admiral Bradley A. Fiske, U. S. N.

NOTICE TO MEMBERS

More members, both regular and associate, are much desired. Any increase in membership invariably means

NOTICE TO MEMBERS

More members, both regular and associate, are much desired. Any increase in membership invariably means larger number of papers and essays submitted, and consequently an improvement in the PROCEEDINGS.

You are requested to send or give the attached slip to some one eligible for membership, urging him to join.

By direction of the Board of Control,

G. M. RAVENSCROFT,
Secretary-Treasurer.

CONSTITUTION, Art. VII, Sec. 8.—"The annual dues for regular and associate members shall be two dollars and fifty cents, payable upon joining the Institute and upon the FIRST DAY OF EACH SUCCEEDING JANUARY. The fee for life membership shall be forty dollars." There is no initiation fee.

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To the Secretary and Treasurer,
U. S. Naval Institute,
Annapolis, Md.

Dear Sir:

Please enroll my name as a {*regular* / *associate*} *member of the U. S. Naval Institute from this date.*

Very truly yours,

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